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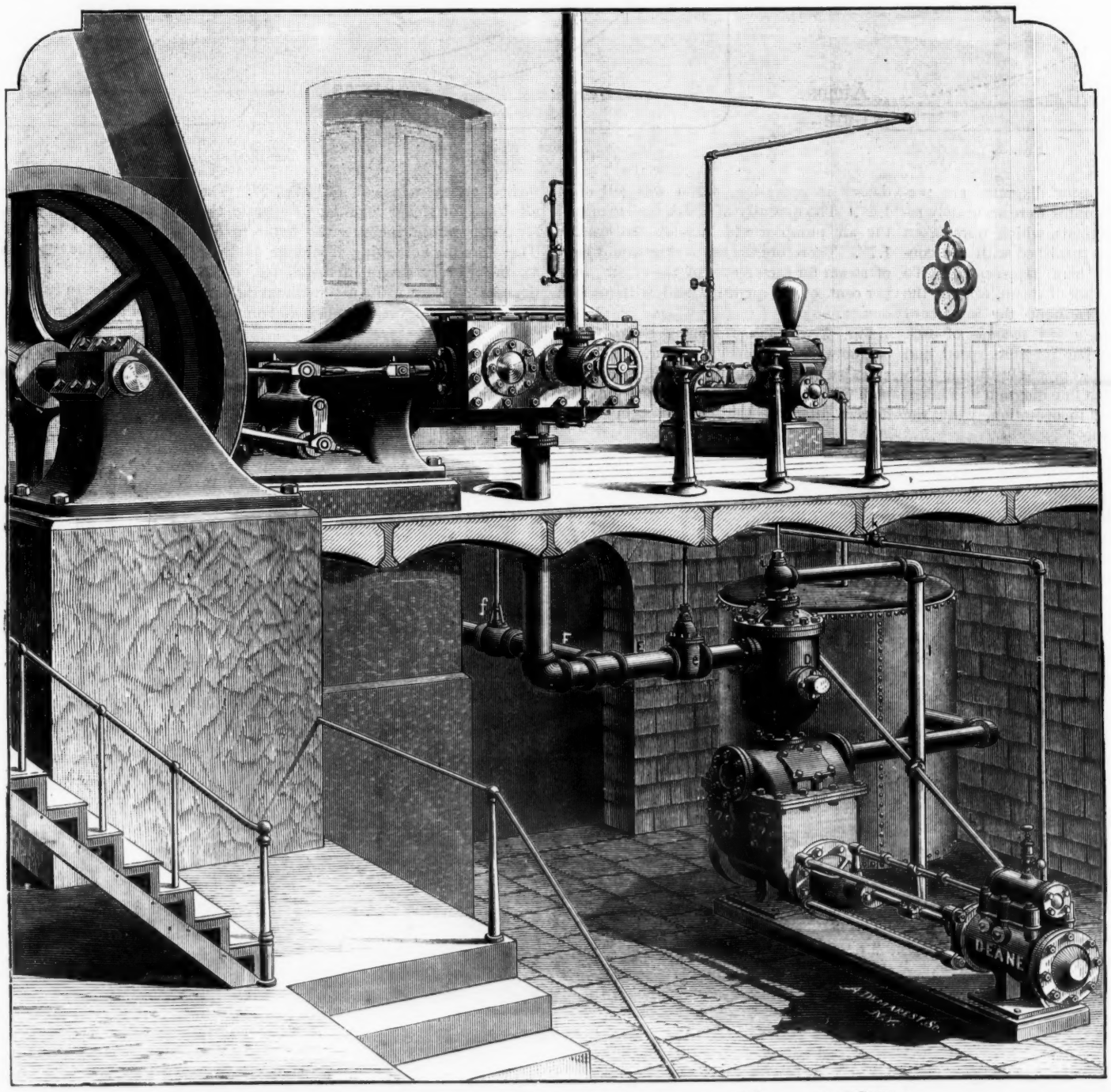
The Deane Improved Air Pump and Condensing Apparatus.

In the AMERICAN MACHINIST of Sept. 24, 1881, we described the Deane condensing apparatus, as made by the Deane Steam Pump Co., Holyoke, Mass. Since that time it has been somewhat improved in detail by the addition of several small appliances to render its use safe in all special locations.



THE DEANE INDEPENDENT AIR PUMP AND CONDENSER, ATTACHED TO A HARTFORD ENGINE.

This condensing apparatus, since its first introduction, has been extensively attached to steam engines and steam pumps of almost every description. The large engraving upon this page represents one of these condensers attached to a Hartford engine. The apparatus is located in a pit or room under the engine room, conveniently near to the cylinder. The exhaust pipe *E* conveys the exhaust steam from the engine to the condenser *D*, where it is met by a spray of cold water which condenses it. This supply of cold water is regulated by a hand wheel connected with the valve *i*. When fresh water is used in the condenser the discharge pipe *G* may be led to a water tank, or hot well *I*, from which the feed water is taken for the boilers by means of a separate steam pump, as shown. The speed of the air pump is controlled by a wheel connected with the throttle *k*, steam being admitted through the pipe *K* to the steam cylinder of the air pump. The exhaust steam passes through the pipe *L*, to the condenser *D*. Should accident occur or occasion require, the exhaust pipe from the engine to the condenser may be closed by the valve *e*, then by opening the valve *f*, the exhaust will escape freely through the pipe *F* into the atmosphere.

When the water used in the condenser is salt, or otherwise impure, so as to render it unfit for feeding the boiler, the discharge must go to waste. It will be understood from the engraving that the entire apparatus is controlled by the engineer by simply manipulating the valve, there being no point in the stroke at which the air pump will not promptly start when steam is admitted. On page 2 is shown an independent condensing apparatus attached to an engine of the Corliss type. The plan of setting the air pump and condenser upon the floor of the engine room is most convenient when the apparatus cannot be placed below the floor of the engine room, as in places where the nature of the ground will not permit a pit or cellar to be built and used for the condensing apparatus. In the arrangement shown, the exhaust pipe *f* from the engine has two branches, arranged substantially the same as that upon this page, one branch *F* being open to the atmosphere, while the other branch *E* conveys the exhaust steam to the condenser *C*. The injection water is supplied through the pipe *I*. In starting the apparatus, the exhaust steam from the steam cylinder of the pump is condensed by water supplied through the pipe *A*. The discharge from the air pump is through the pipe *G*, to a tank, if fresh injection water is used, and to the sewer, when salt injection is used. Steam for driving the air pump is supplied through the pipe *H*. In both engravings shown, a safety device has been attached to the condenser at *D*. The object of this device is to destroy the vacuum, in case there is a tendency to flood the engine cylinder with water.

This device consists of a ball float suspended within the condenser, so that when

the water rises to it by flooding the condenser the ball in rising opens an air valve, destroying the vacuum in the condenser, and at the same time allowing the exhaust steam to escape freely into the atmosphere. This device is simple and positive in its action. By using the condensing apparatus here shown, a low pressure can be carried in the boilers, while allowing the engine to develop power required.

To illustrate how the power of an engine can be increased by attaching this condenser, the following indicator diagrams are presented. These diagrams were accurately reduced from the originals, which were taken from steam engines furnished with the condensing apparatus here represented. To show the actual saving of steam, each of the two diagrams shown upon the same card were taken within a few seconds of each other, the load, boiler pressure, speed, and other conditions being precisely alike in both cases, excepting that one diagram was taken with the condenser in operation, while the other diagram was taken with the exhaust escaping into the atmosphere.

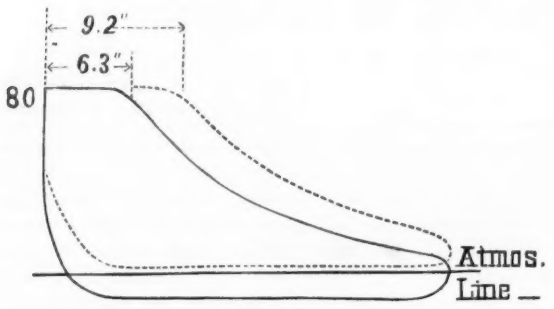


FIG. 1.

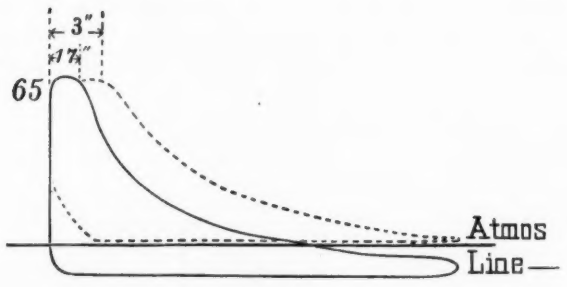


FIG. 2.

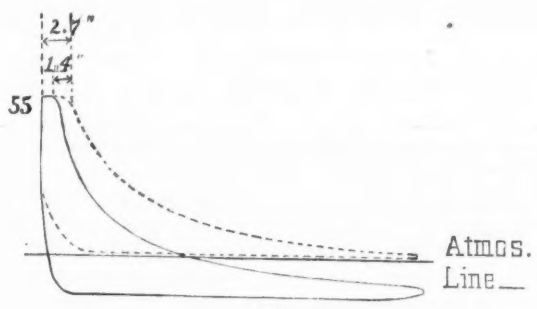


FIG. 3.

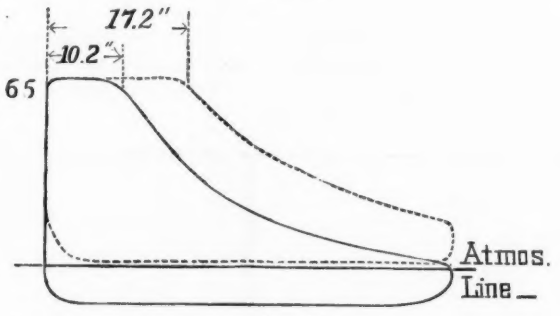


FIG. 4.

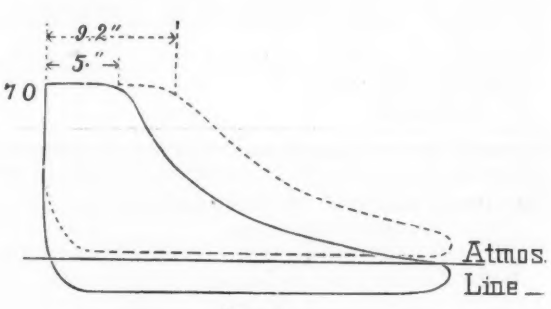


FIG. 5.

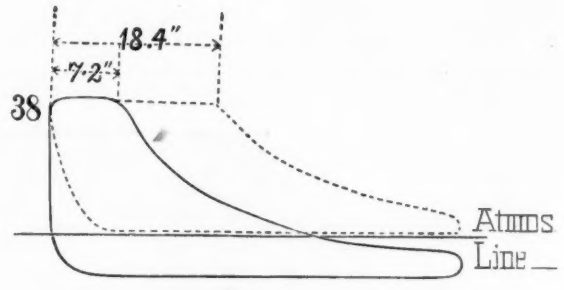


FIG. 6.

In the calculations no allowance has been made for cylinder and other unavoidable condensation, nor for cylinder clearance. These, of course, would have to be deducted from the net saving shown by the indications.

Fig 1 was taken from one cylinder of a pair of Buckeye engines, having cylinders 14″ in diameter and 28″ stroke. The mean effective pressure was 48.9 pounds per square inch by either diagram. Without the condenser the steam was cut off at 9.2 inches, while with the condenser it was cut off at 6.3 inches. The amount of steam required to operate the air pump would increase the latter, so that it would be equivalent to a cut off of 7 inches. The net saving would, therefore, be 2.2 inches of steam at every single stroke, or 23.9 per cent. of that used without condenser attached.

Fig. 2 was taken from a Porter-Allen engine with a 14½″×24″ cylinder. The mean effective pressure was 22.1 pounds per square inch by either diagram. Without the condenser attached the steam was cut off at 3″, while with the condenser in operation the cut off occurred at 1.7″. Allowing for steam to work the air pump, the latter would be increased to 2.2″. In this case the net saving would be 8. of an inch of steam for every single stroke of the engine, or 26.6 per cent. of the quantity used without condenser.

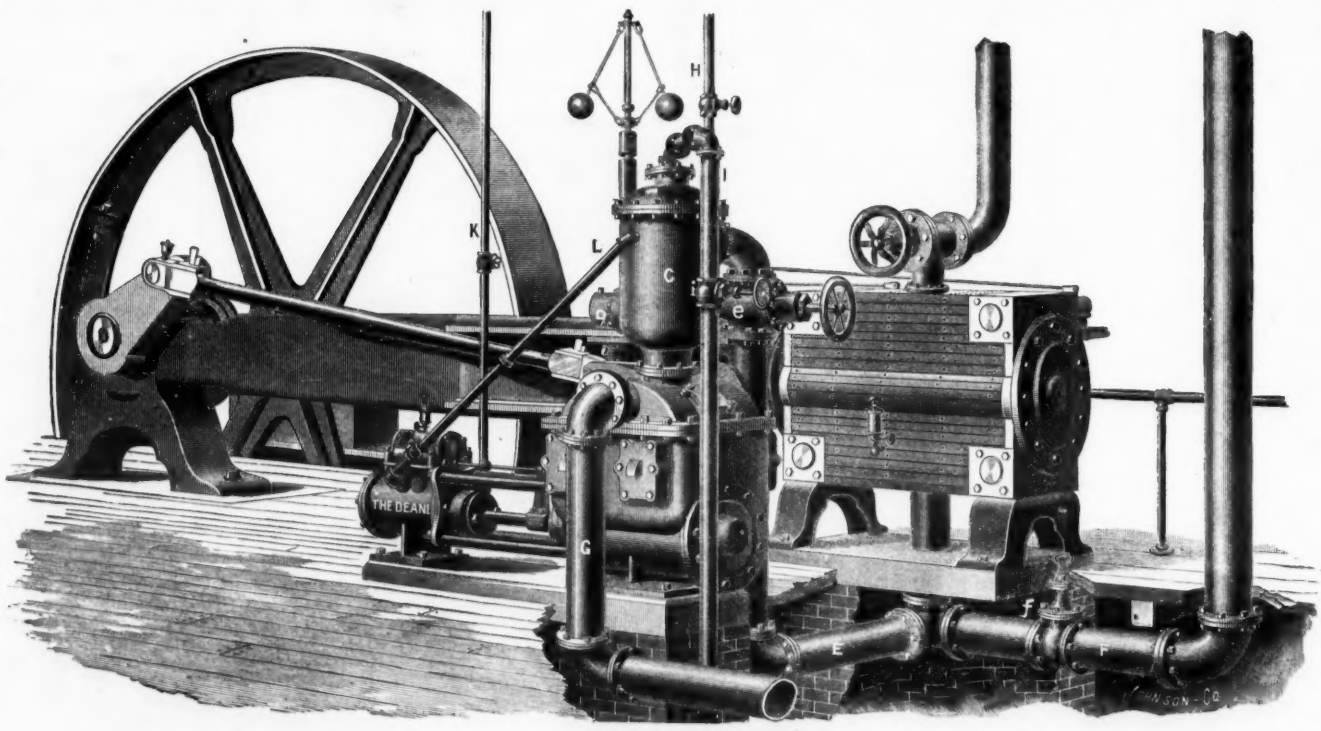
Fig. 3 was taken from one cylinder of a pair of Buckeye engines with cylinders 18″×36″. The mean effective pressure was 14.7 pounds per square inch by either diagram.

Without the condenser attached the cut off occurred at 2.7″, while with the condenser in operation, steam was cut off at 1.4″. The quantity of steam used to operate the air pump would increase the latter to 1.7″. Therefore the net saving would be 1″ of steam for each stroke of the engine, or 37 per cent. of the quantity used without condenser.

Fig. 4 was taken from a Harris-Corliss engine with a 20″×48″ cylinder. The mean effective pressure was 36.7 pounds per square inch by either diagram. Without the condenser attached the cut off occurred at 17.2″, while with the condenser in operation steam was cut off at 10.2″. The allowance for steam to operate the air pump would increase the latter to 10.6″. Therefore the net saving would be 6.6″ of steam for each stroke of the engine, or 38 per cent. of the quantity used without condenser.

Fig. 5 was taken from one cylinder of a pair of Hartford engines with 20″×30″ cylinders. The mean effective pressure is 36.7 pounds per square inch by either diagram. Without the condenser attached the cut off occurred at 9.2″, while with the condenser in operation steam was cut off at 5″, The allowance of steam to operate the air pump would increase the latter to 5.5″. Therefore the net saving would be 3.7″ of steam for each stroke of the engine, or 40.2 per cent. of the quantity used without condenser.

Fig. 6 was taken from the cylinder of a Brown engine with a 16″×42″ cylinder. The mean effective pressure was 23.2 pounds per square inch by either diagram. Without the condenser attached the cut off occurred at 18.3″, while with the condenser attached steam was cut off at 7.2″. The allowance of steam required to operate the air pump would increase the latter to 8″. Therefore the net saving would be 10.3″ of steam for every stroke of the engine, or 56 per cent. of the quantity used without the condenser. Large figures denote initial pressure.



THE DEANE INDEPENDENT AIR PUMP AND CONDENSER, ATTACHED TO A CORLISS ENGINE.

Considerable comment has been made over the fact that some English machine tools have been imported. When our tool builders were pressed with orders for months in advance, several orders were filled in England. American machine tool builders can, however, take more orders in Europe than foreign builders can secure here. Among orders lately received is one by Daniel W. Pond, of Worcester, for a lot of tools to go to England, and one by the Pratt & Whitney Company for another lot to go to the same country.

The fair of the New England Manufacturers' and Mechanics Institute, in Boston, has closed, after making both a mechanical and a financial success. Exhibitors are already engaging space for the exhibition next year.

Idiocy in Lathe Spindles.

BY OBERLIN SMITH.

In an article published a few weeks since, entitled "More Inertia for Machine Shops," the writer endeavored to show the importance of using the *anvil*-principle rather than the *fiddle*-principle in designing machine tools. This applies with especial pertinence to engine-lathes. but the average lathe of today is found wanting not only in respect to the *inertia* of its parts, but in their actual *size* and *strength* to resist deflection. This is particularly the case in regard to their spindles, both "live" and "dead." As the dead-spindle slides in its bearing it must of course be parallel in form; of its size it is enough to say that it should be very much larger in diameter than usually made. There is no possible objection to this, except the expense of a few dimes' worth of extra metal. The increased size does not increase the friction in proportion thereto, as in the case of revolving shafts, and it is not in a position to be in the way of the lathe-carriage or, most generally, of the tool or the work. In special cases, where the "tool-support" requires to be set high and unusually far in, any interference that may occur can be obviated by an extra long dead-center. This latter would not be springy, because the large spindles here recommended pre-suppose, and allow for, extra large centers — both live and dead.

Regarding live-spindles, missionary work among which it is the especial function of this article to perform, it is only necessary to examine a few popular varieties, with the aid of a pair of calipers, to have a horrible suspicion creep over one that their designers were, at particular times in their lives, afflicted with fits of temporary idiocy. The exceeding smallness of spindles may perhaps be considered a matter of inherited tendencies and of vicious example, from the fact that all designers make them in this respect nearly alike. The shape of them—that is, the relative diameters at different parts—varies so much with different makers that we are compelled in many cases to fall back upon the first mentioned hypothesis. If spindles were made enormously large, with

a good deal of the anvil principle embodied, there would be such an excess of stiffness and strength that the exact proportions would be of little importance. As long, however, as they continue to be made with the present elegant slimness, would it not be well to let them give a hint at the ordinary laws which govern the construction of all levers and beams?

The principal strains developed in using a lathe spindle are transverse and torsional; the tensile, compressive and shearing stress being very slight. To resist torsion alone, a shaft should, of course, be parallel, but to meet the severe transverse strains brought to bear upon the right hand end of a lathe spindle its theoretical axial section should be something like Fig. 1 in the accompanying drawings. This is of parabolic form, and is the shape a projecting beam should be, when fixed at the points *A* and *B*, to resist pressure, in a direction perpendicular to its axis, at the point *C*. The diameters shown, are exaggerated, and are not in proportion to the lengths.

Fig. 2 represents a practical profile for a spindle that conforms as nearly as convenient to the dotted line, which is a fac-simile of Fig. 1. It will be noticed that no part of the profile is within the dotted line, and consequently the deflection at any of the three or four weaker points will be about equal.

In Fig. 3 is shown a type of spindle, used by a prominent lathe manufacturer, wherein the prevailing idea seems to be to avoid making a collar for the chuck to abut against, and to get a shoulder for the same by reducing the diameter of the screw, thereby weakening the whole structure at the point *d*.

In Fig. 4 is shown a more common fault, where the whole journal is reduced, and the weakest point is at *e*. This is a worse error than that shown in Fig. 3, as not only is the deflection of the chuck greater (on account of the leverage) but the bending of the journal within itself causes it to wear its boxes out of parallel, and thus make matters still worse by lack of a continuous bearing surface.

Another faulty design is shown in Fig. 5, where the weak point is at *f*, just to the left of the large journal. This seems to have less reason for its being than either of the others, though perhaps it is apt to be the occasion of less harm. Proceeding still further to the left, to the small journal and adjacent parts, we rarely find the diameters much out of proportion—in fact, the size here is of comparatively little importance, on account of its being at the long end of the lever, whose fulcrum is at *B*.

Two of the above located faults are sometimes found combined in one spindle, which, of course, only adds somewhat to the degree of idiocy displayed. The writer has before him a sketch taken from the spindle of a beautifully finished and rather massive looking nineteen inch lathe which was recently made by a house of high reputation, located not more than a thousand miles from a central city of Massachusetts. This spindle shows in a marked degree the faults delineated in both Figs. 4 and 5. The large journal is smaller than the screw, and is but $2\frac{3}{8}''$ in diameter, while the size at *f* is only $1\frac{3}{8}''$. The hub of the main gear wheel, which is keyed on at *f*, is unusually large, as is also the collar at *g*. Surrounding this wasp-like journal are enormously large and heavy brass boxes, the diameter of whose flanges is $5\frac{3}{4}$'! The outside effect of all this was, as before remarked, massive, and the illusion was dispelled only when the thing was taken apart.

As in a murder trial (in the few cases where the prisoner is not evidently, and to the happy satisfaction of all sides in the case, idiotic or insane) a strong point with the prosecution is to show a *motive*, so we may ask regarding this murder of strength and rigidity in an otherwise very strong lathe: What was the motive? Even if the reputation of the maker did not leave such a suspicion out of the question, we could hardly attribute this construction to a desire to make a good show upon the outside and save the cost of metal within. An extra half-inch or so in the diameter of the spindle would not have cost much, if any, more than would have been saved by a larger bore in the iron and brass surrounding it; the outside dimensions of which were, as before stated, abundantly large. The saving could, at the most, have been but a fraction of a dollar, a very insignificant motive upon a five-hundred-dollar machine—as any engineering jury would undoubtedly "agree to believe." Shall we be obliged to fall back upon the unpleasant hypothesis hinted at in the second paragraph?

Another spindle worth describing (if not using) was made in a city not unknown in the State of Connecticut, by a prominent manufacturer, and belongs to a heavy-looking twenty-two inch lathe. The extreme diameter of the screw is $2\frac{1}{4}''$, of the large journal $2\frac{5}{8}''$, and of the adjacent part, where the gear goes, $2\frac{9}{16}''$. This is of course weakest, as shown at *d*, Fig. 3, although it has a good-sized collar for the chuck to rest against. It is, however, chiefly noticeable for being much too small all over.

Joking aside, the true reason for the universal slimness of lathe spindles seems to be that the modern engine lathe has been

Fig. 1

Fig. 2

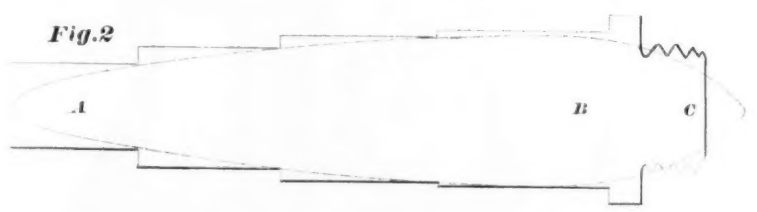


Fig. 3

Fig. 4

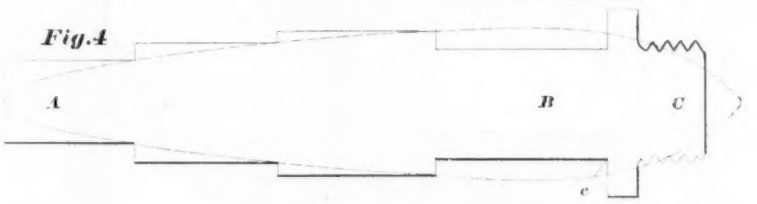
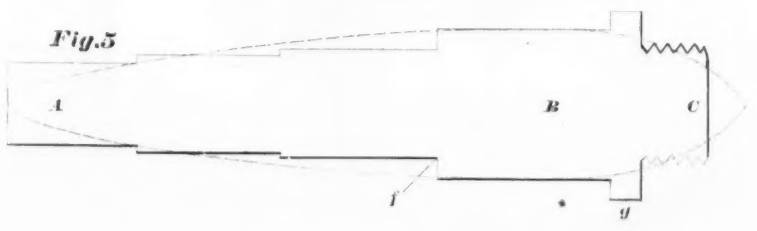


Fig. 5



evolved by a slow process of development, from an ancestor whose spindle was slim for a purpose—the ordinary hand lathe. This machine (which, in its turn, had descended from the prehistoric potter's wheel, with still less reason for a large spindle) could not well be run by foot power, at the high speed used, without reducing the friction in every possible way; and, of course, a small spindle was one of the most obvious means. Then, too, a large spindle was unnecessary, as the cuts were light and the work usually of a material softer than iron. That a development of "bigness" has not made more progress is because it has not chanced that any radical engineering mind has attacked the subject *de novo*, regardless of precedent. Probably one reason that our planers, milling machines, and some other modern tools are capable of taking heavier cuts than our lathes, is just because they *have no* ancestry to speak of, either flimsy or otherwise.

The evil of small spindles is, of course, not so great for centered work as it is for chuck work; but, as the latter has frequently to be performed by all ordinary lathes, it is from this standpoint that we must view them. A most convincing exhibit of his fallacies might be made to an advocate of small spindles by mounting the table of a small planer (say, 20″ wide) upon two vertical studs a few inches long, and of about the average diameter of a 20″ lathe spindle, inserted into each end of another table fitted to slide in the "vees" in the usual manner. Does any one suppose that heavy cuts could be taken upon such a contrivance? Yet the lathe-makers, with a *naivete* which would be comical if 'twere not so sad, go on writing in their circulars about their "front spindle bearings" being so and so—usually naming some diameter very considerably less than 3″ for a 20″ lathe.

Quite pertinent to this subject is a little incident recently related to the writer by a gentleman prominent in engineering circles, who, it may be said, is chiefly engaged in *rectilinear* pursuits. He had occasion to write to a well-known maker regarding a lathe (28″ or 30″, if I remember rightly) that he thought of purchasing. In the answer that he received, especial attention was called to the very large spindle bearing, which was, I think, $3\frac{1}{4}''$ in diameter by 10″ long. His reply was that, if it could be made 10″ in diameter by $3\frac{1}{4}''$ long, he would take it—otherwise not!

A natural principle to follow in determining the proper diameter for a spindle would be to let the bearing surface be about as far out from the axis as the tool—that is, let it have the same surface speed. That there would be no undue friction is shown in the familiar cases of planers, shapers and slotters, where the friction is at precisely the same speed as the cutting; or in drill presses, and sometimes in milling machines, where it is at a greater speed. This principle is also used in certain boring mills where the table is lowered, so as to have a bearing under its outer edge, upon occasion of doing work of large diameter. Reducing a lathe spindle to lessen the friction is exactly upon a par with putting rollers under a planer table, on the plea that the bearing surface moves too fast.

Just here properly comes in the question, what is *the* size of work done in a lathe which has from eight to twelve changes of speed and which turns anything from $\frac{1}{4}''$ to 20″? The answer is that here, as almost everywhere in machine design, there must be *compromise*. We must put up with too light a spindle for the work at the large end of the series, and with too great a bearing speed (and consequent friction) at the small end.

From the above we reason that if a lathe was to do all chuck work, and if there was about as much large work as small, a very good rule would be to make the diameter of the right-hand spindle bearing equal to one-half the "swing" of the lathe. As, however, the majority of lathes do a good deal of centered work, and perhaps more small than large chuck work, a further compromise would very properly reduce this proportion—perhaps in some cases to one quarter the swing. It would undoubtedly be safe to work within the limits of the figures mentioned—making a 20″ lathe with a large journal 5, 6, 7, 8, 9 or 10 inches in diameter, according to circumstances. The friction incident to such a large diameter would not count for both journals, as the left hand one may, on account of the leverage, be much smaller. A good rule would perhaps be to make it one half the size of the large one. The length of the journals is also a matter of compromise. Probably three-eighths of the swing for the large and three-sixteenths for the small journal would be a safe rule.

If the writer were about to have a lathe designed to order for general work, not knowing what particular kind would predomimate, he would feel secure in striking an average between the sizes proposed, and would not object to sending in his specifications the following farmulæ:

Let $D^1=\frac{3s}{16}$; $D^2=\frac{3s}{8}$; $L^1=D^1$; $L^2=D^2$ and $D^3=D^1$; in which D^1 is diameter of left journal; D^2 of right journal; L^1 and L^2, lengths of the same, respectively; D^3 diameter of dead spindle in the tail stock; and s the swing of the lathe. Any modification that might be made in these figures should probably be in the direction of lengthening L^1. It should not be forgotten that an important incidental advantage of a large spindle is the opportunity to make it *hollow*, without practically weakening it—the metal removed lying immediately about the neutral axis.

Regarding material, there is probably nothing better than cast iron, both for spindle and boxes, *providing* they have such a great excess of strength (which is the case with the proposed diameters) as to be in no possible danger of fraction. Besides its inherent goodness, this metal possesses the valuable quality of cheapness; and if it is suitable for the bearings of all our planers and shapers, why is it not for our lathes?

The above views regarding cast iron were pleasantly corroborated on the occasion of a recent conversation upon Babbit-metal, brass, etc., with one of New England's most eminent and experienced machine-tool manufacturers, when, the question being put: "Mr. ——, are there any better bearing surfaces than forged steel upon cast iron?" he replied: "Yes! cast iron upon cast iron; there's nothing equal to it."

In closing this appeal for a new departure in the direction of more efficiency and durability for that most noble and much-abused tool, the engine lathe, I wish to recall a question asked at the close of a former article, already alluded to, and repeat it with a slight modification. Instead of asking who will make and who will use a 20″ lathe with a 5″ spindle bearing, I will put it, who will do the same with a $7\frac{1}{2}''$ spindle? A prediction may as well be here recorded that within a score of years such a diameter will not be considered more out of proportion than $2\frac{1}{2}$ inches is now.

Formal invitations have been forwarded by the National Cotton Planters' Association of America to the cities of New Orleans, Galveston, Mobile, Savannah, Charleston, Richmond, Augusta, Montgomery, Nashville, Memphis, Louisville, St. Louis, Cincinnati, and Baltimore, to compete for the location of the World's Cotton Centennial Exposition, to be held under the auspices of the above association in 1884. It is contemplated to raise $2,000,000 for this exposition, $500,000 of which is expected from the city securing the location, which will be decided upon January 1, 1883, by the executive committee of the association.

Sweetser & Merritt's Upright Drills.

We present with this, engravings representing two sizes of upright drills, made by Sweetser & Merritt, Brockton, Mass. These drills are made from entirely new patterns, with the design of incorporating recent improvements in this class of machine tools.

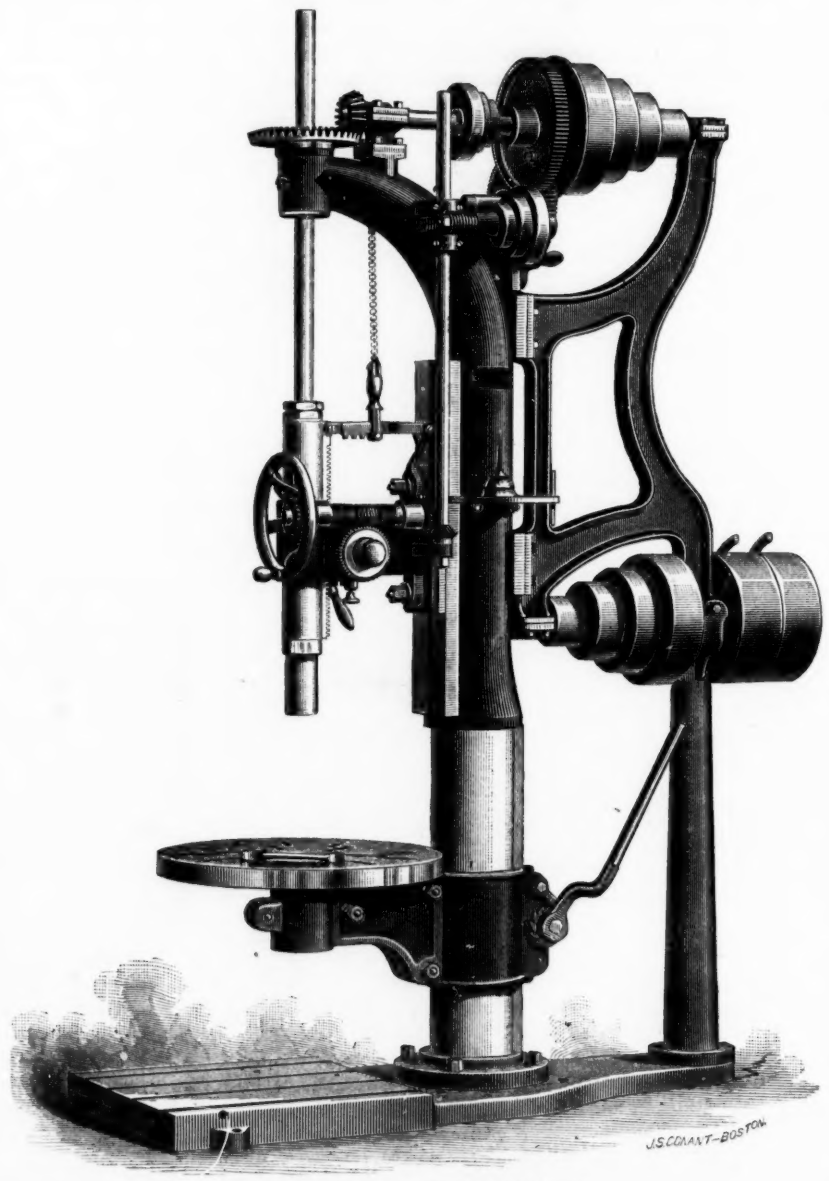
The 26-inch drill has a steel spindle $1\frac{1}{16}$ inches in diameter, with $1\frac{1}{4}$-inch Morse taper hole. Both spindle and head are balanced by the same weight, so arranged as to be operative to balance the head and all attachments when the nuts that hold the head are loosened, thus providing for raising or lowering the head very easily. When these nuts are tightened, the weight acts on the spindle. By a simple arrangement the spindle is equally balanced when the smallest drill or a heavy boring bar is used. Quick return motion is provided, for rapid adjustment, which, in connection with the accurate balance of spindle, is also very convenient for drilling small holes.

The automatic power feed has three changes of speed, controlled by a simple and effective friction.

It will be noticed that the base is large, and extends under the back bracket, giving a substantial support to the machine. The upper surface of the base is planed true, and provided with T slots for attaching work that cannot be drilled on the table. A sleeve may be used in the base for the bearing of the lower end of a boring bar.

The cones have four changes, with $2\frac{1}{4}$" face, and the driving pulleys take a 4" belt.

The 22" drill represented takes in $32\frac{1}{2}$" between spindle and table, or $43\frac{1}{2}$" between head and base. The traverse of both head and table is 18". It is, like the 26" machine, provided with automatic feed, quick return and balanced spindle. The down feed of spindle is 11". Changes can be made very quickly, and without the necessity of a change in position of the operator.



SWEETSER & MERRITT'S 26" DRILL.

Close Fitting Workmen.

BY THOMAS F. HAGERTY.

There are two kinds of close fitters who aim to produce good close-fitting work; but whose methods of accomplishing this result are as widely different as are their natural fitness and abilities, and the results obtained will be marked by their individuality, although to outward appearances they may be the same.

Take the first of our close fitters: from the day he entered the shop as an apprentice, he became painfully aware of the fact that if he remained long enough to become a journeyman, one-half of his time woud be consumed in making mistakes and the other half in trying to correct them. He felt that there was one very unreliable person in that shop that could not be trusted on a job without spoiling it, and that person was himself. Had his employer informed him, at the outset, of the fact that he had mistaken his avocation and that there were other and broader fields of labor better suited to his talents (the corn field, for instance), he would have conferred a benefit on this man and on the mechanical profession; but no such philanthropic impulses enter into the impulses of shop management. The superintendent, therefore, tolerated this kind of an apprentice; he appreciates him for all he is worth, and he is worth more to him than a more reliable one, because with a little watching, more work can be *forced* out of him in a given time, as he will submit to more driving than one "*who is master of the situation.*"

This apprentice is mentally constituted of good material, but loosely jointed. His mistakes serve to make him more cautious, and cause him to jump from one extreme to the other. Give him a tool to forge and he will be sure to burn it; lecture him on overheating, and you may rely upon his heating the next piece to a dark red and hammering it until it is black in the face. In his effort to temper the piece he will be sure to underheat it, and finally settle down to grinding an old tool, and condemning the quality of the steel in the one he was forging.

Put him on a lathe job and remind him of the fact that the last job he did made a loose fit, and he will bend all his energies, even bend his calipers, springing them over the piece in the lathe, to insure his making a tight fit. Start him on a vise job, with detailed drawings to work from, and he will mark his work off closely, but will allow himself a *small margin* to *work from* over the sizes given. After prick punching with care on the outer lines, he will sail into his work with a drill, chisel or file, as the case calls for. Then, after he has roughed it off, he files it with a rough file, next with a second cut, which brings him to his *marginal line*, next with a smooth cut which removes but a small portion of the mountain left.

Now comes the critical part. He remembers the instructions given him, and though he honestly tries to learn them, always fails. They run thus: "Hold the file handle firmly in the right hand with the base of the thumb resting on the bulge of the handle, the first two fingers and the thumb, or the thumb-pad of the left hand resting on the last inch of the file's point; stand erect and well balanced, the left foot in front with the heel pointing to the hollow of the right, the eyes directed on a line across the center of the work, so that when motion is imparted to the file through firmly knit sinews and bones, and the line of stroke is made to follow the line of sight, the mind being fixed upon the effort to produce a level surface, a level surface will be the result."

Yes, he knows all this and more; he knows that he has repeatedly tried this method of proceeding and found the surface high in the center. Therefore he drops into the same slouchy habit adopted by many who claim to be machinists. He grasps the file with the right hand, midway between the handle and the butt, the index finger of the same hand reaching almost to the center of the file; two front fingers of the left hand straightened out rest on the file's point; his back is bent down to the work; his toes are on a line, and his sinews so contracted that the body moves and not the arms, his eyes meanwhile watching each scrape intently. His mind bent on *scraping* down the high places by means of numerous gyrating movements, so he keeps on to the end, and in the end finds that after having wasted a great deal of time and used up good files he has succeeded in making a level surface, or *a tight fit*.

Should you find this workman far removed from the shop where he has learned his trade, he will, no doubt, rate himself as a tool maker, or a "close workman." Should he produce a poor job, he will complain of the tools being old and shakey. "How can you expect a man to do good work with such tools and such dull files?" he will blurt out, then tell you of the nice work he *used to do*, where he had to use a micrometer caliper and a Vernier gauge. Had any of his old shopmates been close by, they would have asked him if he did not mean a *very near gauge*. Fits, indeed! So near and yet so far!

Some who have not seen this kind of machinist may think this picture overdrawn, but I know many who are classed as good workmen, and who, by the methods here described, turn out passable work, that are not worth shop room. Figure each job they do separately, and it will be found to cost, in time and tools, more than it is worth. But the heaviest item of all, although seldom considered, is the one they tax themselves with — the needless expenditure of vital energy and worry. Such a workman is at best but a scraper and scratcher, a "cut-and-try-again," a makeshift, a time annihilator, a botch.

The other close fitter is constituted of material better put together. His mental caliber fits the trade he has chosen, naturally, without further adjustment. The first time that he entered the shop as an apprentice he discovered that there was a right way and a wrong way to do a job, and that if in his efforts to perform his work as directed by those capable of instructing him the result was a failure, the fault was not in the method of instruction but in *himself*, and that to succeed he must practice diligently and steadily, not with fear, but with confidence in himself. Should his efforts result in further failures, he realizes that he must seek for the cause, and reason from cause to effect. When he finally succeeds he is not at all surprised. He would be susprised if he failed. His confidence in himself gives himself control and self-esteem, but self-conceit is absent.

He does not find fault with the drawings and try to pick out defects in the draughtsman's work, nor in any one else. He does not consult with the man next to him as to how he would do the job. He does not growl about his tools, or complain of the shop and its management. He acts well his part, there all the profit lies. He seldom bothers the foreman, after having received his first instructions, nor does the foreman look much after him until the job is finished. When work gets slack, the foreman generally drops off the most unreliable man, and he is *not* that man.

Give him a job of lathe work and note the cool, methodical manner in which he takes hold of it. If there are a large number of pieces, each operation is carried through in regular order, centered, drilled, faced, roughed off, and finished to the gauge; no filing, no scraping, no emery stick; but it is brought to a dead finish by means of properly ground and properly set tools.

Give him a job of filing or fitting in the vise, and he lays out his work right to the lines of measurement. He leaves no margin for slips or mistakes. His lines are sharp and well defined. Should he use a chisel, or coarse-cut file, he works clear up to the lines in the first operation. In using the second cut file, he *splits the line clean in two*, leaving but little work for the dead smooth file to do. All these operations are gone through with without waste of time in trying, by smearing his work all over with red lead to find the bearings, or by laying on the straight-edge or try-square. He knows exactly what he is doing, and, when he gets the surface to where *he wants it*, he lays on the straight edge and finds the surface level, the file-marks running in parallel lines, no deep scratches remaining as an evidence of *forced filing* and clogging of the file's teeth.

He next tries it in the place intended for it, and finds that it requires but little more smooth filing to make it enter and fit—not tightly or forced, but easily, unless a tight fit or shrink fit is required.

This kind of a workman relies more on himself than on the accuracy of his tools. He does not continually talk about fitting up to the one thousandth part of an inch, nor about fine gauges, for he knows that, while finely-adjusted gauges are absolutely essential where fine work is required, it is not the gauges that insures close work; for, after having turned a piece up in the lathe to within a fraction of fitting the gauge, the next cut, although started to size, may spoil the piece, if the tool is not properly set and ground. Therefore, the good workman relies on himself, and the gauge *simply proves him right*.

Such a workman reasons out his line of action before he starts. He knows that certain conditions being given, certain results can be obtained. *How to obtain the best results, in the least possible time, with the least expenditure of physical and mental energy, is the problem he has to solve.*

The *Railroad Gazette* of Nov. 17, has information of the completion of 371 miles of new railroad, making 9,102 miles thus far this year, against 6,241 miles reported at the corresponding time in 1881, 5,056 miles in 1880, 3,042 miles in 1879, 1,840 miles in 1878, 1,892 miles in 1877, 1,970 miles in 1876, 1,150 miles in 1875, 1,664 miles in 1874, 3,288 miles in 1873, and 6,202 miles in 1872.

The *Artizan*, of Nashville, Tenn., says: "Our Exposition has become a certainty, and the time fixed therefor September, 1883."

Tendency Towards Specialties.

In an article on "Special Tools and Special Trades," the *Mechanical World*, of Manchester, England, says:

"Manufacturing engineers are becoming fully alive to the advantage and importance of devoting themselves to one class of machinery. One engineer will take up water machinery, and manufacture water wheels, turbines, or pumps; another will stick to steam engines, another to the manufacture of gas engines, another to cranes and turntables, another to hydraulic machinery, another to weigh-bridges, and others, again, to locomotives—all showing the tendency to become specialists. Bolt and nut-making machinery is another example of the application of special tools to one manufacture. Woodscrew-making machinery, nail-making machinery, pin-making machinery, are still further examples of the same tendency. Our own country has, perhaps, taken the lead in the development of this special tendency, and it may be taken as an example of the perfection to which applied mechanics have of late years been brought by British energy and skill.

"The old-fashioned millwright, that could contract for every kind of mechanical work, is beaten clean out of the field by the newer system, in which one shop sticks to one class of work. He was a valuable workman in his time, but he is fast passing away, leaving, perhaps, an odd specimen here and there, in some rural village out of the convenient reach of railways, where he combines the art of jobbing-smith and millwright in repairing agricultural machinery. He, however, will soon have to disappear, for tramways will reach the village that the railway has kept aloof from, and even repairs will have to be done in special workshops and by experienced workmen. The tendency to specialism is the same with engineering experts. One will be noted for his opinions on steam engines, another on marine engines, another on gas works and water works, and another on hot-blast stoves or blast furnaces. At the technical meeting of the engineers it may also be noted that Mr. So-and-so always speaks upon dust and fuel, and the power of heat, whilst the president will specially call upon another member to favor the meeting with his experience, it being well known that he is an expert in steel-making."

Committee on Tests of Iron and Steel.

At the recent annual meeting of the American Society of Mechanical Engineers, the committee on tests of iron and steel made the following report:

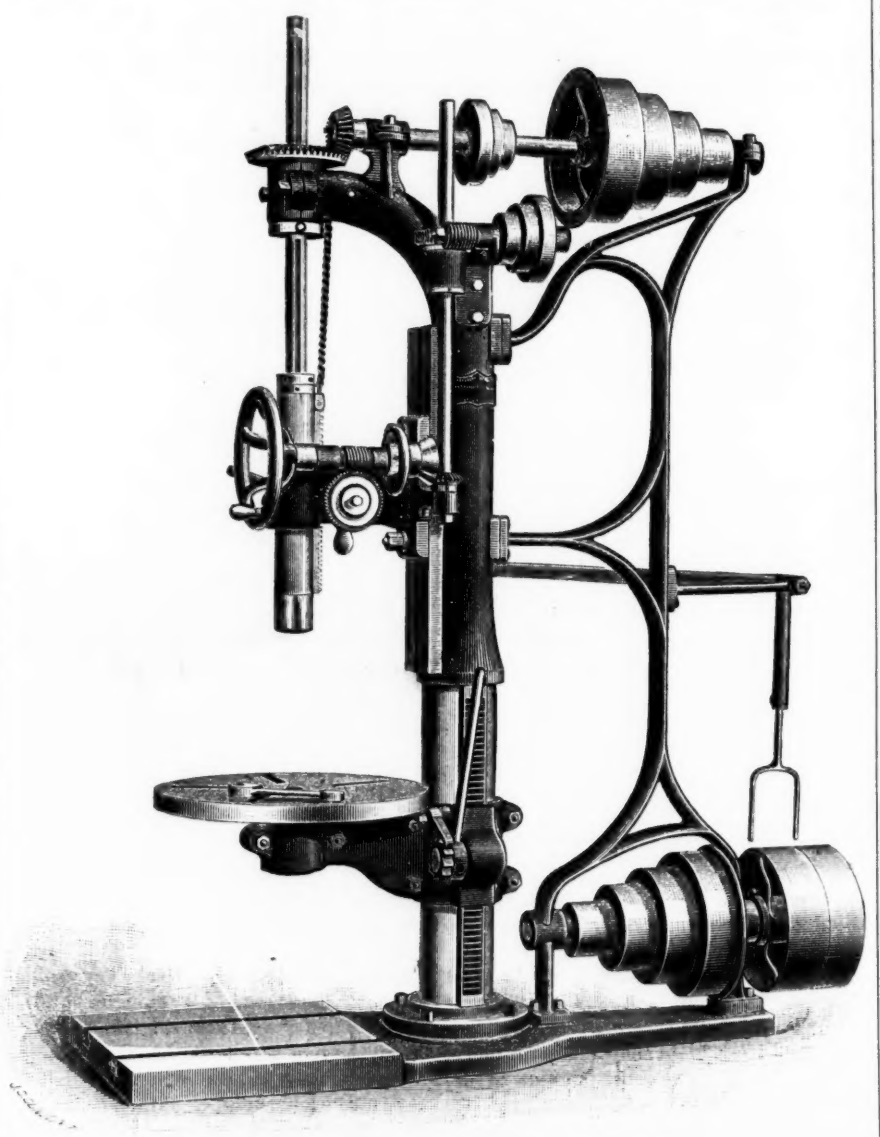
"We have printed and sent out 3,750 copies of the memorial which was read at the Philadelphia meeting, to the colleges and technical schools of the United States, and to iron and steel manufacturers. Up to June 1st, of this year, several hundred signatures have been received and were sent to Washington. Copies of all these were sent by the Chairman of the Committee, the originals being kept in the possession of the Committee, as it has been found under other circumstances it was desirable to have the originals, as if the originals are sent to Washington they are very frequently lost. Your Committee also issued three circulars which were sent with the memorial, one to the colleges and technical schools asking their faculties to send resolutions endorsing the memorial to the Committee at Washington; and another requesting those to whom it was sent to personally urge the passage of the bill upon their Representatives and Senators. A copy of each of these circulars is appended to the report. The committee had several interviews with the different members of the committee and with its chairman, and with a large number of members of the House and Senate, and received from them the assurance that if the bill did not pass Congress at the session of last spring they would do their utmost to have it pass at the next session.

"The vigorous efforts of your society had a great deal to do with the appropriation for the testing machine at Watertown. The efforts of the society should be continued during the coming year."

On motion, the report was accepted and ordered to be printed, and the committee to be continued.

Among the nine medals awarded at the recent Railway Couplings Exhibition, in England, was one to C. Mark, Flint City, Mich., for an automatic car coupler. The other medals went to English and French exhibitors. The *Railway Official Gazette*, of London, says:

"A more interesting exhibition, looked at from the point of view alike of railway employers and employed, could hardly be brought together, and from both sections of the railway community it has received a due share of patronage. The public, however, do not appear to have shown in a practical form that amount of appreciation which the promoters at the outset seem to have expected."



SWEETSER & MERRITT'S 22" DRILL.—(See page 4.)

A terrible boiler explosion occurred November 13 at the Forest City Iron Works, Newburg, near Cleveland, O. It is said that the main boiler in the rolling mill suddenly exploded as the men were going from their work, killing three or four men and fatally wounding several others. The mill was almost completely destroyed. The boiler broke into fragments, one half passing through the roof in a northerly direction, while a large portion was thrown in an opposite direction. The walls were thrown down and a fire started among the *debris*, but was soon controlled. *Cause, as usual.* The boiler was old and rotten, having been damaged by an explosion about ten years ago. It had been patched up and allowed to remain until the present time, when it went to pieces so completely that it will probably not be repaired, unless some junkman buys it and cuts it up to make smaller boilers. The way steam boilers in this country are handled, in the majority of instances, is a notorious farce. Take, for example, the boilers in rolling mills and in steam forges. A boiler is set and bricked in over the furnace, where it is left as long as it will remain together. Then, when it has become so thin by corrosion that it has insufficient strength to hold it together, it explodes, scattering death and disaster in all directions. It is the old desire to save money that induces the proprietors of manufactories to neglect putting in safe boilers, as the old ones will probably last a few months longer. In the course of this time boilers often explode, causing damage amounting to more than the cost of several boilers. We met a gentleman the other day who was up to the neck in grief about a year ago over an explosion upon his premises, killing several men and damaging property in the vicinity to the amount of several thousand dollars. We inquired what kind of a safety-valve he was using upon the new boiler. His reply was that it was a common lever valve, very much like the old one upon the other boiler. This explosion was traced directly to the fact that the safety-valve had stuck fast, causing the explosion. Now here was a man who had experienced all the terrible effects of a boiler explosion, yet to save a few dollars he had neglected to put a positive working safety-valve upon his boiler, and is now running the risk of a repetition of the former catastrophe. We hope that the time is not far distant when the people will take these things into their own hands, and enact laws which will compel owners of boilers to have their boilers inspected regularly, and fitted with generally recognized safety appliances, and to employ competent men to tend them. Until that time comes men will continue to be murdered and torn to pieces in the most barbarous manner by the flying fragments of exploded steam boilers.

The Steam Heating and Electric Light Companies are making themselves unpopular in New York City by their long continued hindrances to the free public use of the main business streets. For several months Fulton street, Broadway and some of the other great thoroughfares have been more or less blockaded by reason of the tearing up of pavements and the excavations for pipe laying. Added to these annoyances, explosions of steam pipes have occurred, and in some cases it has been necessary to tear up the pavement the second time and relay it to correct bad jobs.

Strength of Machine Beds.

BY P. BARNES.

Let me add a brief note to the general fund of experience and suggestion, which is accumulating in favor of heavier weights in the frames or bed-plates, and similar parts of engines and machine tools in general. It is too often forgotten, or perhaps never realized or known at all, that the cost of any probable additional weight, needed to increase the strength of the machine—it may be even tenfold—would be in most cases merely the cost of the pig iron when brought to the melted state, and ready for pouring, in the foundry. The pattern work is substantially the same, whether a frame or bed-plate weigh one ton or three. The cost of molding is the same, and so of nearly or quite the whole of the subsequent handling.

Tastes will no doubt always differ as to the shape which shall be given to frames or standards for machines, but why an engine should be set up on stilts, or on stands of any sort, is hard to understand. It is doubtful if any engine builder would insist that the stilt outline of frame is preferable, after he had once made trial of a solid bed, properly anchored to a foundation.

The rush for high-speed engines of the last two or three years has led to the building of some with beds really worthy of the name, but there are too many still left of the trifling skeleton type, which it is impossible to secure to any foundation in a thoroughly substantial way. It is hard for those who have given attention to the subject to understand why such spider-like outlines should be retained, and insisted upon, except upon the mistaken supposition that an addition of one-third to the weight of a machine would add proportionately to its cost.

The real fact is more likely to be, as already suggested, that the increase of cost would not exceed one-tenth, and in many cases one-twentieth, while the increase in strength and general stability in many cases would be tenfold.

When Fogg heard that cigars were largely made by machinery, he said he had noticed a stationary Indian in front of nearly all the cigar shops.—*Boston Transcript.*

One of the gratifying features of the late election is the adoption of the free canal amendment to the constitution of the State of New York by over 200,000 majority. In the old geography which we studied at school the fact was made prominent that "New York ranks first in commercial importance among the States of the Union." It is evident that the citizens of the Empire State who did the voting on the canal question learned that old geography lesson in their younger days, and were determined that there should be no cause to change it in the new editions prepared for the rising generation.

The Oregon Short-Line Railroad is said to be the straightest railroad in the world, from American Falls to Shoshone, eighty miles. The track is laid on a lava bed the entire distance, and there is not a drop of water between the two points. The contractors are trying to push the line to Shoshone before winter sets in.

The New York, West Shore, and Buffalo Railroad at present employs, in construction, 20,000 men, 110 steam and compressed air drills, 19 steam excavators, 4 dredging machines, 3,700 horses and carts, 30 locomotives, 1,200 cars, 70 steam derricks, 20 pile drivers, 27 tugs, scows, and canal-boats, and 9 steam pumps. It is expected that the road will be completed from Weehawken to Buffalo by August, 1883.

Shop Kinks.

No. 39.

By LEWIS F. LYNE.

DEVICES FOR LIFTING LOCOMOTIVE STEAM CHESTS AND COVERS.

One of the most difficult and unpleasant operations in repairing is the lifting of steam chests and their covers.

Almost every one who has done anything at that kind of work has either had his finger-nails blackened, or otherwise injured himself, by the slipping of wrenches or blocks used to support those cumbersome pieces of cast iron.

It is generally the custom in round-house repairs to remove steam chests and covers hot, to facilitate the work. Unless the workmen are unusually careful their hands will be burned, or other accidents may happen.

To avoid serious causalities, the very ingenious device shown in the accompanying engraving, Fig. 1, has been designed. The only one of the kind that we know of in use was designed by Mr. Bartlett, an engineer on the New Haven and Northampton Railroad, and now constitutes one of the most essential appliances among the tools of the round-house at New Haven. This piece of apparatus is quite simple and easily made, consisting of a round iron stay *A*, with a hook at one end to hook over the top of the smoke-stack, while a chain hook *C* at the other end is used for adjusting the boom *B* in a level position.

This boom may be made in a variety of ways to suit the particular taste of the designer. I prefer to make it of flat iron, as shown in Fig. 2, at *F*. The jaws may be made circular in form, but if made as shown, they will rest firmly against smoke-stacks *G*, of varying diameters. An elevation of the boom and jaws is shown at *I*, *H*.

Usually, the hole in the center of steam chests is tapped to a stated size; at all events, the threads are of the same pitch upon most of the locomotives upon a road, so that a screw eye or plug, shown at *N*, in Fig. 2, may be made, which will, by means of the tapered thread, fit the various-sized holes in the covers. By screwing this screw eye into the cover, and attaching a tackle, as shown at *E*, in Fig. 1, the cover, though hot, may be easily raised clear of the studs and lowered upon a truck. A wheel is made to roll upon the boom *B*, while a shackle, extending below, receives the tackle *D*. For lifting steam chests, various appliances have been used, but the one shown in Fig. 2 will be found very convenient. It consists of a stout ring with two links *O*, *O*, attached to it, similar to a pair of car-hooks. The peculiarity about this device is the jaws *K*, *K*. They are a combination of a car-hook and jaw, with set screw. When the steam chest has a horn at the front, a rope around the horn and the stuffing-box will answer for a sling to lift it by; but when there are no horns, other means have to be resorted to. If there are flanges upon the steam chest, the hooks *L*, *L*, may be used; but if there are no flanges, it may be easily lifted by the jaws, as shown, attached to the steam chest *J*, *J*, by set screws.

A front view of one of these jaws is shown at *M*. It costs but little to make these appliances, and when once made they will last a lifetime. The hooks *L*, *L*, are not only convenient for handling steam chests, but may be used equally well for handling boxes and barrels in shipping and unloading supplies. Railroads and other shops suffer much for the want of simple, efficient and inexpensive labor-saving devices similar to this. The fact is, *that no railroad shop can well afford to be without these appliances.*

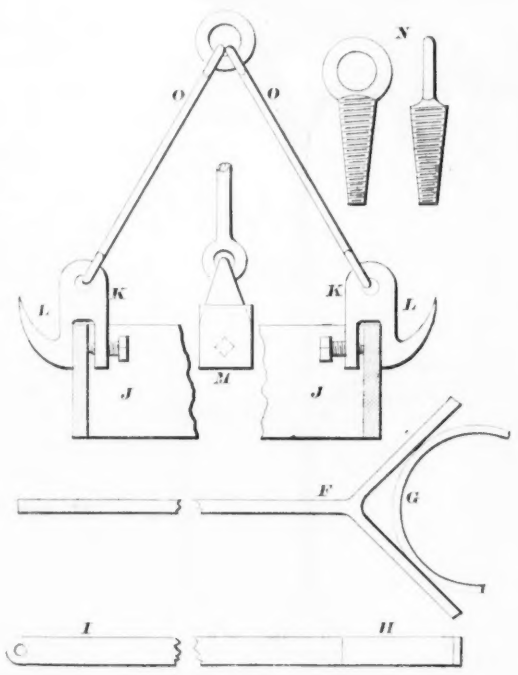


FIG. 1.

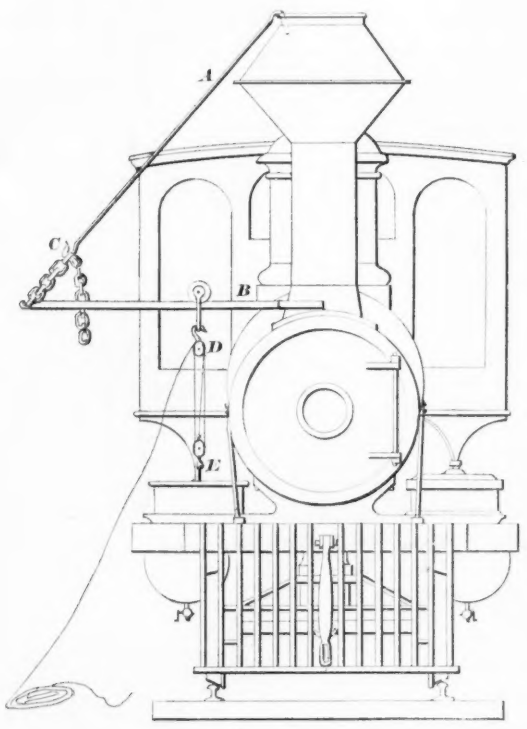


FIG. 2

LETTERS FROM PRACTICAL MEN.

Giving and Taking Orders for Work.

Editor American Machinist:

The first step towards the accomplishment of work is the order, and the importance of clearly giving, and fully understanding the order is not always appreciated. A great deal of trouble and expense may be avoided, or incurred, as the case may be, by the way the order is given and taken.

It is not every owner of a steam engine who realizes that the machinist cannot furnish a new piston for his engine, on as short a notice, and with as little trouble, as the miller can furnish a barrel of flour.

I have heard orders given something like this: "I want a new piston for my engine. Will be shut down all day to-morrow; good chance to put it in. Old one is running yet; do not know the exact size, but it is about 18 or 20 inches. Must have it to-morrow."

To take an order from such a man, includes educating him up to a knowledge of the time that such work takes, and preparing his mind so that the shock will not be too great on presentation of the bill.

Taking an order, and promising a time for delivery, when there is little probability of having the work ready at the time specified, makes bad work in the shop and in the office, and the man who makes the practice of doing this, deserves to lose his customers. The best of men are liable to make mistakes in estimating the time required to do a job, and enough trouble will result without planning for more. It is a good plan to keep a record of the time on every job, to refer to in estimating on a like or similar job.

Sometimes it is thought that a drawing or a sample tells the whole story, and any questions as to what a thing is for are thought to be irrelevant, if not impertinent. I once took an order from an artist who had a good drawing of what he wanted. I inquired what the thing was for, and he told me to make it just like the drawing, and it would be all right. The drawing was full size, and I think had been made free handed, but it was a prettier picture than I could make with instruments. The lines were so well defined, so even in their width, and the curves were so graceful, that it was a pleasure to look at the drawing. It was only a small piece; the pattern was the principal cost, and the whole bill was $6.00.

"Six dollars for a harness hook!" exclaimed my customer. "Why," said I, "if we had known it was a harness hook, the pattern could have been made in less than half the time." He did not see that knowing what a thing was for, had anything to do with the time of making it.

I took up a stick and whittled it a little, and asked him if he could make a piece *just* like that as quickly as I had made it. No, he could not. But, said I, if I tell you it is a plug to stop the outlet of that wash-basin, you can make a piece to fill the hole as quickly as I did it. He saw the point; paid the bill and went away satisfied; but not every one would have yielded so gracefully.

To give an order for something *exactly* like this, or that, may do, if exactly means as near as may be, or if we know what a thing is for, we may know just how near an approximation we must make to have it answer the purpose. Fine haired fellows may sneer at work that is "good enough"; but can they turn two pieces of shafting *exactly* alike? Can they scrape surface plates so that they will show no spots? Can they even write their own names twice alike, *exactly?* They can do these three things "good enough," only.

The man who pays out his money, and takes the responsibility of results, is entitled to have his work done as he orders it, whether he be customer or proprietor. Professional pride sometimes cannot admit this, but any machinist having a house built for himself would want it done according to his order.

I know a successful carpenter and builder, who says that he would lay shingles butts up, if his customer wanted them laid that way, or put the roof next to the cellar, if ordered. A great many things will work that do not look as if they would, and there is generally more than one way to accomplish a given result. I often do work differently from what I would advise, and I am often surprised to see how well it turns out.

The journeyman in a strange shop is very apt to make mistakes at first from not fully understanding his orders. The foreman, with his many and pressing duties, may not always realize the embarrassment of a new hand, and give the order just as he would to one of the old hands, which might be plain enough to them, but not to the new hand, although he may be a good workman.

Mr. Clark, who was foreman of the job department in the old Lawrence machine shop, used to say that the boy had some philosophy on his side, when he excused his poor spelling by saying that he had not yet got the hang of the school-house. It is a good plan to repeat an order after a foreman, and if the order is written, it is well to read it aloud. It is a very bad plan to give the impression that an order is understood, when it is not; hoping to see through it afterwards. Many serious results have followed taking orders in that way, and have been called misunderstandings, when the recipient of the order had no understanding of it at all. It is a great deal better to say at once, "I do not understand it," no matter if the foreman is busy, or even cross, and no matter if it may seem to show ignorance or stupidity on your part. Good sense will appear later, in having the work properly done.

F. J. MASTEN.

Machine Structure.

Editor American Machinist:

I see by your issue of Nov. 25th, that Mr. John Richards is strongly in favor of large flat surfaces for lathe shears, as against the practice of mounting carriages and tail or headstocks on inverted V's. Mr. Richards is high authority on such subjects, and has had opportunities of observing the different practices on both sides of the Atlantic and Pacific slope possessed by few.

They say first impressions are always the strongest.

I was apprenticed where large flat surface bearings were the rule, and have worked on some lathes in this country of the same style, but have generally been employed where V's were the fashion. I am strongly in favor of the flat ways, not only on account of less friction, but for durability. You will find no subject where there is such a difference of opinion among workmen as on the friction question, and the majority favors short, small bearings. In a shop where, from a wretched system of economy, oil of a poor quality is used, there will always be trouble with bearings, cutting and getting dry. If a man were working piece-work in such a shop, it would be better for him to buy pure oil out of his own pocket than to use such trash. We have lathe carriages here mounted on small V's, that get cut on the ways when most used, and have to be replaned on an average every three or four years.

Some builders do not let the V's bottom, but they slide very hard, and when the pressure of a heavy cut is applied they wedge down.

A new 30" swing lathe came into a shop where I was working, many years ago, with a very heavy, long carriage mounted on V's. It worked very hard and one of the workmen suggested chipping out the middle and letting it only bear a few inches at each end, but the foreman, who was an advocate of long bearings, replied: "nonsense! If friction increased with increased surface, Whitworth lathe carriages could not be moved with a 5-foot lever."

Some builders of lathes make the ways as soft as pumicestone, in order to plane them at a quick speed. Of course such ways will always wear and cut more readily than moderately hard iron. We lately got a new shaper of large size from a western firm. It had very large, flat bearing surfaces and square edges and gibs both at the bottom and edges; bearing the whole length, as Mr. Richards says lathe carriages ought to bear. Some of the advocates of small V's said, when the machine came, there was far too much bearing surface; that the ways should have had V's, and the gibs should have been only 4" at the ends. But the proof of the pudding is in the eating. The machine slides as easily as any machine in the shop, and if well taken care of by wiping and oiling, will show no wear for years; if the barbarous practice of laying wrenches, tools, hammers, etc., on the accurately and splendidly scraped flat ways is not practiced.

That there are many advocates of short bearings for journals and sleeves, I am well aware.

I was some 24 years since bothered with a cone-lock nut working loose, owing to the cone being a loose fit on the spindle. It only bore about 3" at each end, and had been babbited. I bushed the cone with two hard brass bushes 10" long at each end. It ran quite easily, and does not show a particle of wear, although it has been running constantly ever since. I think the inside of the shears is a good place for a lathe screw, just under the outside way, where it is protected

from dirt and moves the carriage steadily. I see Mr. Richards disapproves of "the inaccessible, complicated apron gearing." They have to be carefully watched, and frequently taken down, oiled and cleaned. Where the foreman is an advocate of the don't be so particular system, the simpler the construction the better.

I cordially agree with Mr. Richards about the want of power in the spindle gearing. That is the most common fault of the average lathe, although there are exceptions. No lathe ought to have to cut to its full capacity; there ought to be a reserve power for emergencies. The common practice of having belts as tight as a fiddle string, and then the workman having to pitch into the belt with both fists to help the work over the heavy cut, is ridiculous. The objection to making the cone make from sixteen to twenty revolutions to one of the spindle, on account of the abrupt jump of speed from the single speed to the quickest on the back gear, could easily be overcome by having two sets of pulleys on the countershaft. I see some of the imported English lathes have three small and three large pulleys, partly to give a greater variety of speed, and partly for a quick return motion in screw cutting.

The clutch system is not durable. They have all been taken down here after some years' wear, and replaced with loose and fast pulleys.

I don't know when the slide lathe was first introduced. Mr Richards says the first were made by bolting small V's on wooden frames. I believe Maudsley, of London, was the first to introduce the compound slide rest, about the end of the last century. There was considerable opposition to it manifested by the old hand turners, who thought less experienced men would be worked in on lathes. Nasmyth, the inventor of the steam hammer, experienced like opposition when he introduced the shaping machine.

I was glad to see in last week's issue your article on "Stability of Machine Tools," and the want of judgment displayed in preparing foundations. Some shops, instead of building piers under each end for the legs of the bed, make a solid foundation the whole length of the shop.

The new railways have a first-rate chance of equipping their shops with machine tools of the latest and best style, and some of them are doing so; but others, where the purchasing agent is not a mechanic, are just as likely to fill their shops with cheap trash.

A friend of mine in Illinois said first-class work was not appreciated there. What paid him best was to buy second-hand engines and machines, give them a superficial repair, then a liberal coat of paint, particularly gaudy stripes,

VETERAN.

Fort Wayne, Ind.

A meeting of all the promnent manufacturers and business men of Chattanooga; Tenn., was held in that city, Nov. 18th, and it was unanimously agreed to organize a movement to have a national industrial, mineral, and mechanical exposition in Chattanooga in 1884. Committees were appointed and the matter will be actively pushed forward.

A New Boring Bar.

Our correspondent, Geo. B. Foote, of Helena, Montana, has invented and taken steps to patent a new boring bar, especially designed for boring taper holes. Mr. Foote, being located at such a distance from any facilities for manufacturing or putting this tool on the market, has placed the matter in charge of William B. Harison, 55 Chambers street, New York City, who, we presume, is empowered to make arrangements for the manufacture and sale of the boring bar. Mr. Foote describes his invention in the following communication:

Your issue of 11th instant came to hand last night, and I see therein an answer, No. 392, to "J F. S.," in which you refer to the boring bar I described in your issue of November 25, 1882.

I can remember having many discussions with brother machinists in years gone by, who denied the possibility of boring taper holes with a boring bar, and I have given the matter some thought, and had intended to send you a sketch of the method of boring taper holes in a manner similar to that you described to "J. F. S.," in the last part of your answer to him, and to that end I had designed a boring bar adjustable for boring either straight or taper holes, or adjustable to any required taper. I take the liberty of sending you the accompanying sketch of the idea, so that you may reproduce it in your valuable journal if you think it would be of any interest.

In the sketch, Fig. 1 is a top view, in which *A* represents a section of the piece being bored, *B* is the bar, *C* the sliding cutter head, *D* the driving head, and *E* the set-over head. *D* is keyed to the bar *B*, *E* is gibbed to and slides on *D*; *F* is the driver, and forms a part of *E*; *G* is the set-over screw, and is attached to *E*, and works in a nut attached to *D*. The driving head *D* is graduated to inches and parts of an inch on its side, as shown. *H* is the head center, *I* the tail center, and *K* is the cutter attached to the cutter head *C*.

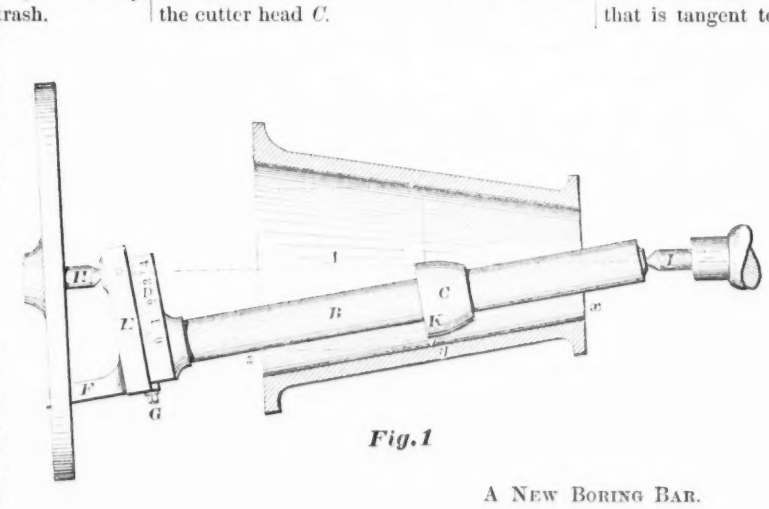


Fig.1

A NEW BORING BAR.

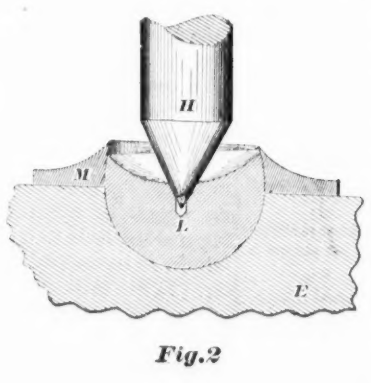


Fig.2

The cutter head *C*, is fed along the bar *B*, by a screw not shown in sketch, but in the same manner as on the bar which I described in your issue of Nov. 25, 1882.

Fig. 2 is an enlarged cross section of a part of *E*, showing the method of adjusting the centers, in which *L* is a rolling piece, and *M* a cap to hold it in place. The center in the end of the bar *B*, is constructed in the same manner. These rolling pieces are put in so that the centers will adjust themselves in line, no matter how much the taper may be set over.

When the zero points, *O*, *O*, are brought together the bar will bore a straight hole.

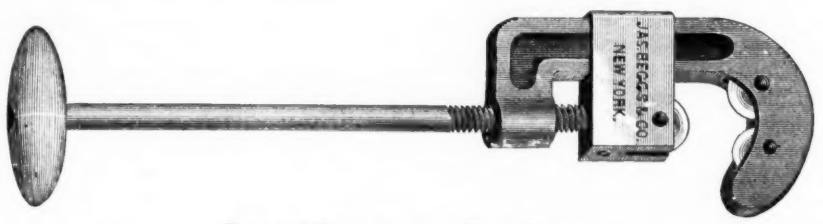
In your answer, you tell "J. F. S." that he can clamp the pieces to the bed of the lathe; true, but usually, I would clamp to the slide rest, for this reason: by clamping to the slide rest the depth of cut and size of hole can be easily regulated without disturbing the cutter. By moving the piece toward the head stock the depth of cut will be increased, and *vice versa*.

With this boring bar, a hole can be bored part taper and part straight, if such a hole was required; for instance, if it was required to bore a piece on a taper from *x* to *y*, and straight from *y* to *z*, then use the feed screw on the bar until the point *y* is reached, then stop the bar feed and throw in the back feed of the lathe.

I believe that this bar is original, in its design, with myself. I have never seen one like it used or described. I think it may be useful in many cases. GEO. B. FOOTE.

Helena, Montana.

BROCK'S CHAIN PIPE TONGS.



BARNES' THREE-WHEEL PIPE CUTTER.

Brock's Chain-pipe Tongs and Barnes' Three-wheel Pipe-cutter.

The chain-pipe tongs, represented by the accompanying engraving are made entirely of steel. The gripping dies are of separate pieces of steel bolted to each side of the handle, so that when one side becomes worn they can be reversed and the other side used, and finally, when they are entirely worn out by wear and resharpening, they may be removed and a new set substituted. These parts are interchangeable, duplicates of which are kept in stock.

When these tongs are attached to a pipe, the teeth in the dies exert a pressure in a line that is tangent to the surface or circumference of the pipe, instead of in a line with its diameter, so that the encircling grip of the chain and the relation of the teeth to the surface of the pipe prevents crushing it.

This is a very important advantage, especially upon the smaller sizes, in which a flat-linked chain is used, giving an almost complete bearing upon the surface of the pipe.

It will be understood that each pair of these tongs, with the reversible jaws, is equivalent in wear to two pairs of ordinary tongs. The jaws are made of a better quality of steel than is generally used for pipe-tongs, and are carefully tempered.

These tongs will fit all sizes of pipe, and are remarkably light compared to their strength.

The pipe-cutter herewith presented, is intended for the general use of plumbers, gas and steam fitters. It is intended for cutting off pipe without revolving the cutters the entire circuit of the pipe to be cut. This is of advantage in corners and other cramped places where the ordinary single wheel-pipe cutter could not be used. It is also claimed to cut more freely, and with a less expenditure of power than the old style of single wheel cutter. No. 1 of this style cutter will cut pipe from one-eighth inch diameter to three quarter inch. No. 2 cuts from three-quarter inch to one and a half inches, while No. 3 cuts from one and a half inches to three inches These tools are being introduced by James Beggs & Co., No. 9 Dey Street, New York.

George W. Richardson, of Milton, Vt., has invented a new form of traction engine, a model of which is on exhibition at Bunnell's Museum, Brooklyn. In this engine all gearing is done away with. The cylinders are connected in the usual manner to a crank shaft, from which three cranks convey motion to as many discs on the main driving shaft, by means of cams that engage the surfaces of the discs. The action of these cams is quickly reversed, to drive in either direction. Beside dispensing with the use of gearing, another feature of this engine is that the leverage at which the cams work on the discs can be changed at will, so that the speed of the engines can be kept uniform, whether traveling at two or ten miles per hour, thus permitting the full engine power to be applied to starting heavy loads, or to drawing heavy loads at a slow speed.

Mr. Richardson's present address is 87 Myrtle avenue, Brooklyn, N. Y.

One of the straws which shows the way the wind blows, is a press dispatch from Philadelphia, dated November 22d. It reads:

"Vice-President Thompson, of the Pennsylvania Railroad Company, to day gave orders to the Grant Locomotive Works, of Paterson, N. J., for 40 locomotives, and to the Pittsburgh Locomotive Company for 15. He also issued orders for the building of 6,000 more cars for the lines east and west of Pittsburgh."

One of our readers wants to know of some city or town, outside of New York State, where there is a good chance to work at brass-finishing—"where brass-finishing business is flourishing." Another, who says he is a good mechanic, would like to spend the winter in the South, and would like to know where is the best place to get a good job. We shall be glad to receive and communicate to these individuals the desired information. Some of our readers can furnish it.

The capital stock, $8,000,000, has been subscribed for the completion of the Wheeling and Charleston Railroad, and work will be commenced at once. The route is down the Ohio, from the terminus of the Pittsburgh, Wheeling, and Kentucky Railroad at Wheeling, W. Va., to Point Pleasant, and thence up the Kanawha to Charleston.

A correspondent who wishes himself to be known as "Apprentice," says he has invented a new substance for filling recesses in steam chest covers, cylinder heads, etc., and for clothing the outside of cylinders. He mixes three parts of sawdust and one part of plaster Paris, with sufficient water, and applies immediately. He does not give any results of the use of this mixture; as for instance: whether the mixture becomes porous when dry, or after some use, or whether it is liable to crack badly, etc.

The representatives of several large manufacturing firms have recently informed us that inquiries by mail in regard to prices, etc., of their products were never more numerous than at present.

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NEW YORK, DEC. 9, 1882.

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Tariff and Business Interests.

The near approach of the proposed general tariff revision does not cause anything near the degree of uneasiness among manufacturers that some daily newspapers pretend to observe. The problems of protection and free trade have been well discussed in almost every part of the United States, and the prevailing sentiment of the people is unmistakably in favor of a protective tariff. Although the next Congress will be composed largely of new members, it is quite unlikely that a majority can be brought up to the point of enacting laws to ruin our most valuable manufacturing industries by removing the tariff or cutting it down so as to give European manufacturers the advantage in competition. It is not reasonable to suppose that any political faction in Congress will be so blind and reckless as to deliberately sacrifice itself upon the altar of free trade. Every unfavorable feature of the business situation is now being dilated upon in the interest of a certain class of political adventurers.

It would be unwise to predict anything in regard to the general condition of business from the stoppage of western rolling mills manufacturing steel rails. Steel rails are almost exclusively rolled to order; the fact that there are considerably more than 100 different patterns in use in the United States, being almost an effectual barrier against the accumulation of stock, even were mill owners disposed to such a course. It may be accepted as a fact that railroad corporations have, to a great extent, ceased ordering, partly due to the hopes of lower prices, and partly to the fact that they are over-supplied, and that railroad building has received, as has long been expected, something of a check. The late A. L. Holley, some years since, strongly urged the advisability of taking steps to reduce the number of patterns to a few standards, to the end that mill owners might be able to distribute their work by accumulating stock when orders were slack, to assist in meeting the demands of heavy orders without crowding their facilities. The extent to which the capacity of the mills has been increased to meet late demands of course increases the present embarrassment.

Boiler Inspection and Insurance.

The complete benefit of boiler inspection and insurance will never obtain, until a more hearty co-operation between the owners of boilers and the insurance companies is brought about. We do not say that this co-operation does not in many instances exist, but that it is a fact that in too many instances the matter is looked upon by the boiler owner too much in the light of an agreement on the part of the company to pay damages in the event of an impending disaster, and too little in the light of something which, so far as may be, is to prevent disaster. In instances that have come under our personal observation, what in ordinary business transactions would be termed sharp practice, has been resorted to on the part of the owners of steam boilers, or their representatives, as if in getting a boiler passed and prospective damages covered by hiding or withholding facts that would, if known, prevent its accomplishment, a sharp bargain was driven. It is a satisfaction to believe that such acts do not contemplate instrumentality in the endangering of human life, but that they are rather the result of thoughtlessness, and the not altogether unnatural instinct to get as much for the money as it is possible to get. But it ought to require no argument to demonstrate that such practice, whatever the motive may be, directly tends to defeat the really important end of inspection and insurance, viz., the prevention of boiler explosions.

There is something especially repugnant in the idea that a man pays a stipulated sum with the chief end in view of receiving compensation for property destroyed in a boiler explosion in which perhaps a half dozen persons lose their lives. However much it may be disguised by words or phrases, it presents exactly the appearance of putting dollars and cents against, not one's own life, but against the life of others. It is equally repugnant to look at a boiler insurance company as a corporation whose highest aim is to make money in spite of, not to say by the aid of, boiler explosions. Yet this is precisely the way the whole matter must be looked at unless boiler owners co-operate with boiler insurance companies to reduce to the narrowest limit the probability of the latter being called upon to make good losses from explosions. When the transaction is entered into with the chief end of affording security to life, the compensation looked for being only an incidental consideration, covering the extreme probability of something that the united efforts of all parties to the transaction, working in harmony to that purpose, cannot prevent, it appears quite different.

Boiler insurance differs materially from most other forms of insurance in that it is, or should be, intended to cover a contingency which, to make a bull of it, does not exist. Men get their lives insured because death is certain, or they get their property insured against fire because there are reasonable expectations that it will be destroyed by fire, but the proper intent of boiler insurance is to prevent destruction, not to compensate for it. Naturally the public are not particularly interested in any money consideration of the subject; that is, they are not concerned in it as an insurance, but they are interested in the inspection part of it, just to the extent that it offers additional security to life, and hence have an interest in seeing that it does not degenerate into a mere calculation of probabilities, like life or fire insurance.

We assume that the principal object of boiler insurance companies is to do a legitimate business in preventing boiler explosions, not to make money because they do occur; but it is not enough that they alone take this view of the matter. It is of equal importance that those whose property is insured take the same view of it, and that both parties co-operate to bring about identical results. The idea should be entirely out of the mind of the owner of a boiler, that he pays a premium to cover probable loss, and in its place the idea that he pays to prevent a loss.

This idea carries with itself the idea of co-operation, by which alone the benefits of boiler inspection and insurance are realized. It has the advantage of being in no sense an ideal view, but rather the only practical one, and commends itself as affording the means whereby both parties to the transaction may make money, and benefit and satisfy the public.

The public are interested in knowing that boiler insurance companies do not have any losses to pay, more than in the fact that they pay losses promptly.

A Favorable Land Grant.

A company of local and American capitalists have procured the right to construct a railroad on Vancouver Island, British Columbia, connecting Esquimalt harbor with Nanimo and the coast of Johnson's straits. The local legislature has come to the rescue, and has granted the company 2,000,000 acres of land, with a right to all coal and minerals found on or under it. The length of the road will be 150 miles, all the way through a valuable country.—*Railway Review.*

As this land grant covers about one-fifth the area of Vancouver Island, and as four-fifths of the entire surface is little better than barren rock, it will be interesting to watch the progress of this great plan for public improvement until the railroad company owns the whole island, "from the center all round to the sea," including, of course, everything "found on or under it."

M. A. Springer sends a communication in which he takes exception to an "Indicator Rig," published in the AMERICAN MACHINIST, but he neglects to state his objections clearly either in words or by drawings. Also neglects to give his full address. If he will do this, we would be pleased to justly consider his criticisms.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Will J. W. O., St. Paul, Minn., give his full name?

(436) I. M., Middle Granville, N.Y., asks: In filing a caveat will it be necessary to send a model, or will a drawing answer? *A.*—Send drawing.

(437) J. H., Boston, Mass., writes: I have several rubber triangles that have become warped by getting wet. How can I straighten them? *A.*—We cannot suggest any better way than by again wetting them and then allowing them to dry while firmly held between two flat surfaces. You can try the experiment on one of them, and govern yourself by the result.

(438) A. H. S., Brookville, Pa., asks: Will you please give me the proper dimensions of steam ports and valve for an upright engine 6″x8″, to run at 250 revolutions? *A.*—See answer to G. M. D., in the AMERICAN MACHINIST of Nov. 11, 1882. The dimensions there given will be ample for any speed at which you may be likely to run your engine.

(439) T. D. L., Rochester, Minn., asks: How many and what size stays shall I use on a boiler head ⅜″ iron, 36″ diameter, with 26 tubes 3″ diameter; steam pressure 100 pounds? *A.*—Use 1″ stays pitched from 5½ to 6 inches. Without seeing a drawing of the boiler we should presume it would require about 8 stays.

(440) W. E. M., Brooklyn, N. Y., writes: I am using small rolls for rolling gold and silver. These rolls, 2½″x3″, are made of bar steel turned and hardened. What I want to ask is: 1 Cannot these rolls be steel castings; that is, will not steel castings stand the necessary hardening as well as the forged steel? *A.*—We should say that steel castings would hardly do. They will not harden as well, and are liable to have more or less blow holes in their surface. 2. What is the composition of jewelers laps? *A.*—They are sometimes made of copper with a very little lead, sometimes of copper and tin, etc. Any brass foundry can make the castings.

(441) W. O. J, Providence, R.I., writes: I am about to build a small steam engine 1½″x3½″, to run at 250 revolutions, and should like to ask: 1. How thick should I make the cylinder? *A.*—¼″. 2. How thick shall I make the piston? *A.*—¾″. 3. What should be the size of steam and exhaust ports, and the travel of the valve? *A.*—Steam port 3-16″x1″; exhaust port ⅜″x1″; steam lap ⅛″, exhaust lap 0; travel of valve ⅝″ 4. What should be the length of connecting rod? *A.*—10″ will be a good length. 5. What should be the diameter of the shaft? *A.*—Make it ⅞″. 6. What should be the diameter and weight of fly-wheel? *A.*—15″ diameter; weight, 60 pounds. 7. What horse power would this engine develop with 75 pounds boiler pressure? *A.*—From ¼ to ⅓ of a horse power. 8. What size boiler will it require? *A.*—Make a boiler 12″ diameter and 32″ high.

(442) Chipaway, Chicago, Ill., writes: I have an engine 3″x5¼″; steam ports 5/16″x1½″; exhaust port 7-16″x1⅝″. 1. What power can I get from this engine? *A.*—At 300 revolutions and 70 pounds boiler pressure, from 1½ to 2 horse power. 2. What lap, inside and outside, should I give the valve to get all the work I can out of the engine. *A.*—Your ports are not well proportioned. They are too short and the exhaust port is too narrow for the width of steam port. You can give the valve ⅛″ steam lap, and no exhaust lap. 3. If the steam ports of an engine are increased ⅛, will not the power of the engine be increased in the same ratio? *A.*—Not necessarily nor generally. If the steam ports are too small, increasing their size will add something to the power of the engine. If of the right dimensions, increasing their size will add nothing to the power.

(443) E. E, Groton, N. Y., writes: I have a cupola 33″ in diameter at the tuyeres and 28″ at the top; tuyeres 3″ from bottom I use a No. 5 Sturtevant blower. It takes me 2 hours to melt 3 tons of iron. Can you suggest a remedy for such slow melting? *A.*—It would be impossible to locate the trouble without knowing more of the circumstances. Your fan may not run fast enough or the wind pipe may be too small or badly arranged, &c., &c. We think beyond question, however, that you would get better results by lowering your bed to not less than 7″ below the tuyeres. 2. How long should the fire be lighted before the blast is put on, using Lehigh coal? *A.*—That depends on the natural draught; usually from 30 to 40 minutes. 3. Can I get cleaner casting from coke than from coal? *A.*—Not necessarily. 5. How should I charge up my cupola for the best results? *A.*—No one can tell you definitely at a distance. You must find out experimentally. We should advise you to lower your sand bottom, see that your blower runs up to speed, with wind pipe and tuyeres clear, and then try the effect of charging in different ways, carefully noting results. By this means you will find the best way to charge up your cupola.

(444) J. S., Pittsburgh, Pa., writes: I am having trouble with a boiler on account of lack of draft. The boiler shell is 48″ diameter; fire box 48″ long, 42″ wide and 40″ high; smoke box 23″ long and full size of cylinder. The smoke stack is 20″ diameter and 40 feet high. There are 7 flues from fire box, each 11 feet long and 6″ diameter, and 30 return flues 3″ diameter. The draft is sluggish, the flues choking up after firing up two or three times. Some said the smoke box was too large, so I cut it down but without any beneficial result. I am going to put on a 24″ stack to please the customer, but I don't think that will improve it. I should like to know if the stack is too small or too large; also if the length of flues is not too great? *A.*—The diameter of stack is sufficient, but it is quite too short. A boiler of the kind described should not be connected with a chimney of less than 80 feet in height. The length of the 3″ tubes is more than we should recommend, but with a suitable height of chimney there should be no serious difficulty on that account.

(445) R. C., Youngstown, Ohio, writes: I wish you would inform me how to get about leveling up heavy machinery on foundations, and making permanent bed for same. Which is considered best, sulphur, or cast iron and sal-ammoniac. I want to know how to go about it so as to make a good job. I have to erect some large engines? *A.*—It is impossible to give specific directions for setting any piece of heavy machinery, unless it is known exactly what it is. The setting of such machinery is more a matter of common sense than anything else. For instance you must line your main shaft with whatever it is necessary to put it in line with. This you must devise ways of doing that will suit the peculiar circumstances of the case. With a reasonable extent of bearing surface we believe there is nothing better than brimstone between the foundation and bed-plate. For information in regard to using brimstone, we refer you to answer to J. W. N., in the AMERICAN MACHINIST of Apr. 22, 1882. Set your engine to line with whatever you have to line it, holding up by wedges as there described, and melt and pour your brimstone according to instructions there given. Brimstone will run in a space from ⅛″ to ¼″. If you prefer to use cast iron and sal-ammoniac you must wedge the bed enough above the foundation to admit a caulking tool, to drive the mixture solid under the bed.

(446) F. L. S., Jamestown, N. Y., asks: 1. Is it possible to get a partial vacuum in the cylinder or in the exhaust pipe of a non-condensing engine when the engine is first started and the pipe cold? *A.*—It is possible to get a partial vacuum in the cylinder of a non-condensing engine at any time, when running, if the cut-off is so short as to carry expansion below the atmospheric pressure. When first starting up this might, under some circumstances, be brought about by the condensation of steam in the cold cylinder. As the exhaust pipe of a non-condensing engine is usually open to the atmosphere, there could not be a vacuum in that except very slight and momentarily, since the atmosphere would force itself into the pipe and equalize the pressure. In long exhaust pipes, used for heating, with a valve near the end, there will sometimes be a partial vacuum before and just after starting the engine, owing to the condensation of steam, and to the fact that the valve does not open until there is a pressure in the pipe. 2. What will cause the pencil of an indicator to mark below the atmospheric line in taking a diagram from a non-condensing engine? *A.*—If the indicator is in good order, the line it draws represents at all times the pressure in the end of the cylinder to which it is attached; hence, when that line is below the atmospheric line the pressure in the cylinder is less than that of the atmosphere.

(447) W. C. H., Providence, R.I., writes: Parker's Philosophy says, "The lateral pressure on one side of a cubical vessel will be equal only to one-half the pressure downwards," while Avery's Philosophy gives the following rule for finding the lateral pressure: "To find the pressure on any vertical surface, find the weight of an imaginary column of the liquid whose base is equal to the given surface, and whose altitude is the same as the depth of the center of the given surface below the surface of the liquid." From this last definition I should infer the lateral pressure to be equal to the downward pressure. Which is correct? *A.*—Both are right, as you will see by applying the reasoning in the last quotation you make to the cubical vessel mentioned in the first quotation. For instance: the downward pressure is equal to the weight of the water, but since as you only measure to half the depth of the water for the lateral pressure against one side, that pressure will be equal to only one-half the weight of the water. 2. I have a stream of water issuing from a pipe 1″ in diameter, with a force of 40 pounds to the square inch. If I put a conical nozzle on this pipe, reducing the outlet to one-half the area of the 1″ pipe, how much do I increase the force, or pressure? *A.*—If the same amount of water passes, the pressure would be 160 pounds per square inch. 3. If there is an increase of force, or pressure, is it not exactly equivalent to the increase of velocity, and can I gain anything in work with a definite quantity of water? *A.*—The velocity of efflux under different pressures is as the square root of the pressures, and the impact is as the square of the velocity. By reducing the diameter of the nozzle as you suggest, and doubling the velocity, you will increase the force of impact to four times what it is at present, but at the same time you will have increased the pressure behind the nozzle four-fold, so there is no gain. In other words, you increase the pressure (or dynamic head) in just the same proportion that you increase the force of impact.

BUSINESS SPECIALS.

Transient Advertisements, 50 cts. a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

C. M. Morse, Mech. Engineer, 132 Nassau St., N.Y.

F. Samuelson, Pattern Maker, 38 Gold St., N. Y.

James W. See, Consulting Engineer, Hamilton, O.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

Portable Forges, $10. Holt M'f'g Co., Cleveland, O.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N.J.

Latest and best books on Steam Engineering. Send stamp for Catalogue. F. Keppy, Bridgeport, Ct.

J. M. Badger, Expert and Commission Dealer in Machinery, 5 Dey Street, New York.

J. C. Hoadley, Engineer and Expert, 29 High St., cor. Federal, Boston, Mass.

Wood Engraving done in best manner. Designs furnished. Edward Sears, 48 Beekman St. New York.

Howard S. Abbot, Solicitor of Patents, 617 7th St., opposite the Patent Office, Washington, D.C.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

Pattern Maker's Assistant. By Joshua Rose. 324 pages, $2.50 by mail, postpaid. Address orders, P. O. box 3,306, New York City.

A lot of 25″ lathes designed to equal the best Philadelphia tools, will soon be ready for delivery. Ohl & Co., E. Newark, N. J

Engine Lathes, Speed Lathes, Foot Lathes, Upright Drills, Light Drilling Machines and other fine tools, Frasse & Co., 62 Chatham St., N. Y.

Lyman's Gear Chart. Shows how to make an Odontograph, and contains a scale to accompany it. Price 50 cts. Address, E. Lyman, C. E., New Haven, Conn.

Simpson's Manual of Screw-Cutting, complete. single copies 25 cts. or 5 for one dollar, cloth covers 10 cts. extra. Address, W. Simpson, P. O. Box 46. East Boston, Mass.

"How to Keep Boilers Clean," and other useful information for steam users and engineers. Book sent free by the publisher, Jas. F. Hotchkiss, 84 John street. New York. Mention this paper.

L. V. Conover, Iron Founder, 326 to 340 East 29th Street, New York. Heavy and Fine Castings of Iron, Brass, Composition and Copper made to order at shortest notice.

Russell & Struthers, Wax Process for making outline engravings. Specimens each week in the AMERICAN MACHINIST. We also do Map Engraving with best facilities. Russell & Struthers, 59 Park Place, New York.

Six first-class screw cutting engine lathes with compound rest and power cross feed; equal to best Philadelphia tool in design and finish; ready for immediate delivery. Address Jos. B. Reed, Cairo, Ill.

The Theoretical and Practical Boiler Maker, 335 pages, and 37 lithograph plates. Published by the author, S. Nicholls, Yorkshire street, Blackpool, England. Mailed on receipt of P.O.O value $1.83, to Blackpool. See Review, AMERICAN MACHINIST, p. 8, July 22, 1882.

The *Sanitary Engineer* of Oct. 19, publishes with illustrations the report of Chief Engineer Durand Claye, of Paris, on the just completed Sewerage System of Berlin. It presents in each issue a great amount of matter of special interest to engineers, contractors, steam fitters and plumbers. If any reader of the AMERICAN MACHINIST who may now be buying the *Sanitary Engineer* of news dealers, will request it, the publisher will send him two weekly issues free if this advertisement is referred to. Address the *Sanitary Engineer*, 140 William street, New York. (P. O. box, 3037.)

MANUFACTURES.

The Fargo Iron Works, at Fargo, Dakota, claim to have done a business of $2,500,000 this year.

Furness Bros., Chicago, Ill., are building an improved lathe for the Chicago Brass Works.

Godey & Strom, Chicago, Ill., are building a new machine shop.

Factories now put up in Aberdeen, Miss., are freed from taxation for ten years.

Several of the large factories in Bridgeport, Ct. are obliged to run evenings to keep up with orders.

The Silver Star Works have been organized in Chicago with $300,000 capital, to make crucible and open-hearth steel.

The Belcher & Taylor Agricultural Tool Company of Chicopee, Mass., has nearly finished a two-story addition to its works, 90x104 feet.

The Foundry, Machine and Boiler Works of Geo. R. Lombard, Augusta, Ga., now employ over 100 hands, and are turning off a large amount of work.

The Russell Car Wheel and Foundry Company of Detroit, Mich., have about completed a large addition to their works.

The Pennsylvania & Western Railroad company have purchased five acres of ground in Etna, Pa., as a site for shops.

F. Clement, Rochester, N. Y., is making an improvement in his band-sawing machine. He employs 15 hands in manufacturing the machine.

The Pound Manufacturing Co., Tenefly, N. J., also the Passaic (N. J.) Bleachery are setting their boilers with the Mahony furnace to burn cheap fuel.

Marland & Neely, nut manufacturers, Pittsburgh, Pa., have purchased two lots near their factory from Joseph Keeling for $3,000, and will erect thereon a large addition to their factory.

The Licking Rolling Mill Company, of Cincinnati, are stated to have a controlling influence in the Maumee Rolling Mill, of Toledo, organized at that place during last August, with $500,000 capital.

The Rivet Co., Cuyahoga Falls, O., is putting in new machinery to increase the capacity for work and to do away as much as possible with night work.

Andrews Bros & Co. proprietors of the rolling mill at Haselton, Ohio, recently removed from Niles, have introduced hot polished shafting among their products.

Johnson & Field, fanning-mill manufacturers, are putting up a 88x34 feet two-story addition to their already large manufacturing establishment, at Racine, Wis.

Work has commenced at Waterbury, Vt., on the new factory for making wagon axles. The citizens having subscribed $5,000. The work of building goes on rapidly.

Reynolds & Co., Machine Screw makers, New Haven, have their new building 90x30, two stories, all done, and are filling it with new machinery as rapidly as possible.

The Gibbs & Sterritt Manufacturing Co., Corry, Pa., have been closed by the sheriff on a judgment in favor of the Second National Bank of Titusville. They gave employment to 600 hands.

R. J. Woods will soon set about the establishment of a cotton gin manufactory in Eufaula, Ala., and will have a foundry, machine shops and wooden works in connection therewith.

The new works of the Syracuse Iron & Tube Co. in East Syracuse, N. Y., have been started up and will soon be in full operation. It is said that 1,000 men will be employed.

The foundation for the new Goss Iron Works at Bath, Me., is progressing rapidly. In the course of the piling work, bed logs 75 years old have been unearthed in the mud, perfectly sound.

The new iron manufacturing enterprises at Birmingham, Ala., are giving the business interests of that town an unprecedented boom. Houses are going up rapidly, but not fast enough to accommodate tenants who want them.

Additional machinery is being placed in the Chicago Splice Bar Mill, and the capacity of the mill will be increased to 1,000 tons of finished bars per month for 1883, with a fair prospect of having orders sufficient to run a double turn.

The Purgatory property in Botetourt Co., Va., formerly belonging to Jos. H. Schultz, has been sold by him to the Purgatory Iron Company for $125,000. A few years ago this property sold for $10,000.

One hundred and sixty thousand dollars were subscribed in Chattanooga, Tenn., Nov. 20th, for a 100-ton iron furnace to be built there. The work will begin at once, and the furnace will be one of the finest in the country. Several more will be built later.

The Litchfield Car and Machine Company, at Litchfield, Ill, are enlarging their works by an addition 70x40 feet. The addition will contain the tools and machinery for the manufacture and finishing of engines, and will greatly increase their facilities for work in that line.

The Phœnix Boiler and Sheet Iron Works is the name of a new concern just established at 1234 North Main street, St. Louis, Mo. Mr. Dan'l H. Prindable is sole proprietor. A new boiler shop, having a frontage of 25, and a depth of 80 feet, will shortly be added to the works.—*Age of Steel.*

The rolling mill at Canonsburgh, Pa., will be in running order in a few weeks. The machinery will be driven by a 300-horse power engine; 40-ton fly-wheel. A 5-ton Conde steam hammer has been erected. The capacity of the mill will be 12 tons of finished sheet iron per day. Three hundred hands will be employed.

The Portland Steam Packet Co. are having built a fine side wheel steamer, 1700 tons burden. Mr. John English builds the hull, and the Quintard Iron Works the engine and boilers. James Mahony's patent paddle wheels will be used. She will be named the Cumberland, and will be put on the route next June.

The Lambertville Iron Works, Lambertville, N. J., have been enlarging their works during the past year, to increase the facilities for manufacturing their automatic cut-off engine. Although this engine has been in the market but a short time, the large and increasing demand for it rendered this step necessary.

Osgood & Macnaughton, Albany, N. Y., manufacturers of underwater and land excavators, derricks, &c, have at present, in addition to large home orders, foreign orders for nine of the combined steam excavator and derrick cars, illustrated in the AMERICAN MACHINIST of Aug. 19, 1882. They are at present turning out one of these machines complete each week. The business of this company is steadily increasing, they having been obliged during the past year to place large orders for machinery with various outside parties. They have ordered since the beginning of the year, from one firm (the Lidgerwood Manufacturing Co. of New York), 28 double engines, besides a large amount of boiler and other work to be used with their dredging and excavating machines. Their prospects of business for the coming year are entirely favorable.

The Laclede Rolling Mills, St. Louis, are running double turns in the foundry and other departments. A pipe has been laid from the works to the gas works of the Mississippi Glass Company, and if the latter are successful in the experiments with hydrogen gas, one of the puddling furnaces will be started up with "water-gas" as a fuel.—*Age of Steel.*

It is said that a $750,000 company has been organized in Pittsburgh for erecting new nail and spike works about two miles from McKeesport, Pa. J. C. Bissell, John H. Dalzell, Uriah Haskins and other prominent iron men are interested in the enterprise. The works are to include a Bessemer plant and several Siemens open hearth furnaces.

Jens Jensen, Racine, manufacturer of wagon hardware and malleable and grey iron castings, is making extensive additions, and largely increasing his facilities for turning out work. Among other improvements, he is building a brick addition 41x87 with truss roof, which will be ready for occupancy in about a week.—*Industrial World.*

The Toledo, O., Car Wheel and Foundry company have, it is reported, completed their new buildings which, with yards and railway sidings, cover six acres of ground. The company was organized last year with $100,000 capital, and now have works with a capacity of 100 car wheels a day, besides a large amount of soft foundry work.

The Lenox, Mass., voters have resolved in town meeting that they will use in the future every effort to protect her wronged and suffering people; that the mill-pond owned by the Smith paper company "converting as it does a rich alluvial valley into a noisome swamp, is unlike any other in this commonwealth, and that the statements made by the owners, that in endeavoring to protect the health of her people, Lenox is making an attack on the manufacturing interests of Massachusetts is an attempt to influence public opinion against the town."—*Springfield Republican.*

The Deane Steam Pump Co., Holyoke, Mass., have been obliged to enlarge their works by building a new erecting shop. New tools, such as lathes, planers and boring mills have recently been added. They have just completed a new iron foundry which is known by the title of the Holyoke Foundry Co. The building is 80x150 feet. There will be two 36″ cupolas of their own special design for melting iron. This foundry is provided with all the modern appliances, such as cranes and other labor saving devices. Convenient to the foundry is a separate building for patterns. This building is three stories high, and of a most approved construction for the systematic storing of patterns.

The Holyoke Machine Co. have just completed their new shops at Worcester, Mass. The main building is 152×64 feet, while the annex temporarily used for offices is 44×57 feet. The main building is three stories high and fitted with all the modern conveniences for producing work accurately to gauges within a less time than is usually occupied in making rough fits. This shop has been fitted up particularly for building the Hercules turbine water wheel, the original works at Holyoke being of insufficient capacity to meet the demands of their steadily increasing business. One of the principal characteristics of the new shop is the chimney, which is of brick, 121½ feet high. It is of an ornamental design, though not extravagant, and attracts considerable attention, with very favorable comments.

Wm. Baragwanath, of the Pacific Boiler works, Chicago, Ill., informs us that his business is good the sales of his steam jacket feed-water heater and purifier constantly increasing. He has recently made shipments of these heaters to Rio Janeiro, Brazil, Mexico, and other distant localities. The Edison Electric Light Company have just put one of these heaters, 1,000 H. P., in their station on Pearl street, New York. This heater has connection for 14-inch exhaust, and takes the exhaust steam from six Porter-Allen high speed engines. It is 40 inches diameter and about 24 feet in height. The Edison Company have had one of these heaters in use at their shops for about one year. Benj. F. Kelley, 20 Cortlandt street, New York, the Eastern agent for this heater, informs us that he is placing heaters for Charles Cooper, Chemical works, Newark, N. J.; Ribon & March, Jersey City; Atlantic Dredging Co, Brooklyn; David Brown & Co., (in their new soap works) New York, and Connard & Co., New York.

The shops of the Ames Manufacturing Co., of Chicopee, Mass., are filled with orders for the various machine tools which they manufacture. Within the last two years they have changed and improved all of the various sizes of engine lathes which they make and are now turning out large numbers of lathes ranging from 7½″ swing to 42″ swing. This lathe is made from entirely new designs and patterns and is especially intended for heavy and accurate work. They also make a specialty of 22″ and 27″ planers for which they find a constantly increasing demand, while the call for drill presses and their combined drill and slotter continues unabated. The company give employment in the machine shop to 350 men, and besides employs a large force in the manufacture of sewing machines. In the bronze department they are constantly casting and finishing statuary for artistic and memorial purposes, having recently set up in Fairmount Park, Philadelphia, the elegant statue of Morton McMichael, which was unveiled at the Bicentennial Celebration.

W. P. Davis, North Bloomfield, N. Y., writes us: Have just shipped some of my Key Seat Machines to London and Paris. Orders still come in good, and get some very good letters from parties who are using the machines who seem to be very much pleased with their operation. I have now got machines in nearly all parts of the United States and Canada.

Machinists' and Engineers' Supplies.

NEW YORK, NOV. 23, 1882.

Business in the supply market continues of a jobbing character as most of the business houses in the country are working on short supply with a view of taking the customary account of stock and settling their year's business. The unsettled state of the steel and iron business has had the effect of almost stopping the demand from railroads for supplies, except such as are actually necessary for present use. Prices, however, remain unchanged, and the probability is that there will be no important changes until the first of next year. There is still a scarcity of novelties in tools and mechanical devices in the market.

Cox & Prentiss, of the Cleveland Twist Drill Co., Cleveland, O., have just issued a new circular to dealers with prices corresponding with other manufacturers of twist drills, chucks and other specialties made by them. New special machinery has been lately added to their works, so that their facilities for manufacturing will be very greatly increased.

The Ashland Emery Co., Perth Amboy, N.J., send us the following monthly circular that explains itself:

"As the year draws to a close, we continue to receive extensive orders for Emery, particularly for the fine grades, which increasing in scarcity, and finding ourselves oversold, we have been obliged to decline for immediate delivery.

This year will certainly prove exceptional as regards the consumption of Emery, for never before has the demand reached so great a magnitude, and one effect will likely be, that we shall experience a check to falling prices, if not a gradual stiffening of rates.

Ore is not arriving very freely and should soon be in better demand by the mills."

The Deane Steam Pump Co., Holyoke, Mass., have just issued a new illustrated catalogue of 60 pages, containing excellent engravings of the various styles and applications of their pumping machinery, together with prices of the same. Descriptions of various kinds of apparatus as well as a lot of general information, to be used by those engaged in the erection or management of hydraulic machinery.

Iron and Metal Review.

The production of Pig Iron has been gradually exceeding the demand, until now the stock on hand has assumed large proportions. Furnace men are seeking purchasers, but orders come very slowly and only for immediate use. The demand for finished iron has been declining together with steel rails to such an extent as to materially effect the prices of raw materials. This together with the complaints of the manufacturers that prices are too high and the threats of some of the steel mills to shut down, seem to indicate that a scale of slightly lower prices may be expected in the near future.

We quote prices as follows: Foundry No. 1, $25 to $26. Foundry, No. 2, X, $23.50 to $24.50. Grey Forge, $20 to $21. The prices for Foreign iron have not materially changed since our last report, although the demand has fallen off somewhat. We quote Coltness at $26.50 to $27; Glengarnock, $24.50 to $25; Gartsherrie, $26 to $26.50; Summerlee, $26; Carnbroe, $24.50; Eglinton, $23.50 to $24; Langloan, $26 to $26.50.

Wrought Iron Scrap $28 to $28.50. Steel rails rather demoralized at $40 per ton. Old Rails quiet at $30.50 for Double Heads, and $27 to $27.50 for Tees.

Copper continues in slow demand at 18c. to 18¼c. Banca Tin 28c.; Straits and Malacca 22⅝c. to 22¾c.; Billiton 23c.; Australian 22¾c. to 22¾c.; Spelter, Common Domestic, 5c. to 5¼c; Refined, 8c. to 8¾c.; Silesian 5c. to 5¼c.; Lead, 4¾c. to 4.80c; Refined, 4 90c.; Antimony, Hallet's, 10¾c; Cookson's, 12¾c.; Nevada 12¾c.

WANTED

"Situation and Help" Advertisements, 30 cents for each seven words (one line) each insertion. Copy should be sent to reach us not later than Thursday morning for the ensuing week's issue.

Mechanical draughtsman of experience and best references desires employment. Address, J. H., this office.

Wanted—Position as mechanical draughtsman by graduate of Troy Polytechnic Institute. References furnished. Address, Box 5, care AM. MACH.

Mechanical draughtsman and superintendent with good practical experience, wants employment. X., care AMERICAN MACHINIST.

Steam Users in want of First-Class Licensed Engineers can be supplied with reliable men. Address, Benj. F. Kelly, No. 20 Cortlandt St., New York. Agent for James Jenks' Duplex Injector and The Baragwanath Steam Jacket Feed Water Heater and Purifier.

First-class mechanical draughtsman and engineer; graduate of polytechnic, of long practical experience, able to design any kind of machinery and buildings for same, desires situation. Address H. Y., AMERICAN MACHINIST.

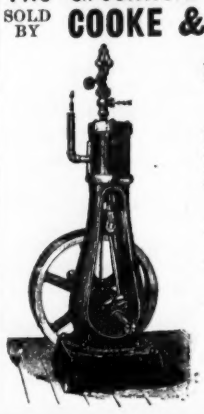
A practical mechanic, at present holding a responsible position, will be at liberty January 1st and desires an engagement. Experienced in designing and constructing tools, fixtures, etc., for duplicate and interchangeable work, fine tools machinery, etc. Address, Box 6, care AM. MACHINIST.

Wanted—An expert wood workman, to take charge of a shop, where a variety of first-class manufacturing in woodwork is done. Must be well informed, of unquestionable habits, and capable of directing men and instructing apprentices. A good position for the right man. Address T. S., care of AMERICAN MACHINIST, N. Y.

Heavy Tools Wanted—First-class 30-foot pit lathe and 6 or 7 foot planer. Send lowest prices with full particulars, and name quickest delivery. M. C. Bullock, Manufacturing Co., 80 Market street, Chicago, Ill.

This is an excellent chance for a manufacturer of light hardware. A little instrument wanted by every mechanic in the country, and wherever machinery is used. Simple, inexpensive and entirely new. Will sell patent reasonably, or let on royalty. Patent, Box 7, office AMERICAN MACHINIST.

The Greenfield Vertical Engine,
SOLD BY COOKE & CO., FORMERLY COOKE & BEGGS,
Dealers in MACHINERY AND SUPPLIES,
6 Cortlandt St. NEW YORK,
Is the Best in the market. Send for our prices before ordering Engines, Boilers, or other machinery.
AGENTS FOR
ROOTS' BLOWERS,
WATSON'S FORGES,
WATERS' GOVERNORS.
KEYSTONE INJECTORS,
Etc.



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NEW
SINGLE HEAD LATHES
Hollow Spindle, Improved Stop Motion,
14 in. Swing 4 to 8 feet beds.
Send for Circular.
JOHN BIRKENHEAD,
MANSFIELD, MASS.,
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Extracts from Chordal's Letters.
One of the most interesting books for manufacturers, mechanics or business men, ever published. Just the thing for a Holiday gift. A great variety of mechanical and business topics treated in a wise and witty way that will be instructive to old and young, and interesting to everybody. The book contains 320 pages, 12mo, and over 40 Humorous Illustrations. Price, $1.50 per copy; by mail to any address. Published by
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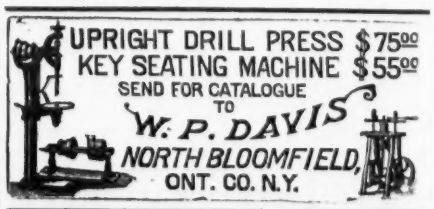
A COMPLETE DIRECTORY
OF THE
HARDWARE, STOVE, TOOL, AGRICULTURAL IMPLEMENT, IRON, STEEL, MACHINERY, ETC.,
TRADES
IN THE UNITED STATES AND CANADA.
After More than twenty-five years' experience in publishing Directories of various kinds, I have finally yielded to the demand of a very important industry of our country to issue a work in their interest, and I hope to have it ready for delivery February, 1883.
The price of the work to subscribers is $5.00 and their name inserted in capital letters. To non-subscribers the price will be $6.00.
ANDREW BOYD,
WIETING BLOCK,
Syracuse, N. Y., U. S. of A.
Publisher of Syracuse City Directory, New York State Business Directory, Musical Directory, Jewelers' Directory, and others.



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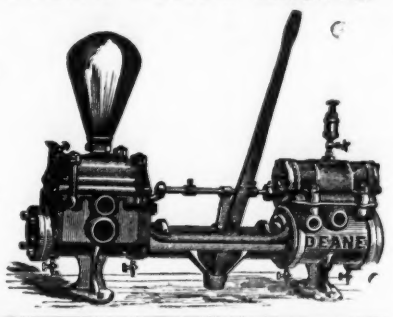

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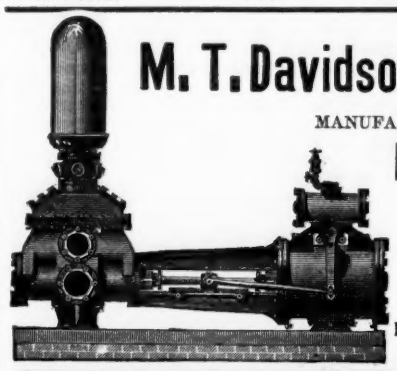
MANUFACTURED BY
Davidson Steam Pump Co.,
OFFICE & WORKS:
41 to 47 KEAP STREET, BROOKLYN, N. Y.
Warranted the Best Pump made for all Situations.
KELLY & LUDWIG, Agents, 49 and 51 North 7th St., Phila., 97 Liberty Street., New York.



Weston's Differential Pulley Blocks,
CAPACITIES FROM ½ TON TO 10 TONS.
ONE MAN CAN LIFT 5,000 POUNDS.
THEY HOLD THE LOAD SUSPENDED AT ANY POINT.
ALL SIZES IN STOCK.
THE YALE LOCK MFG. CO.
Manufacturers, Engineers and Machinists,
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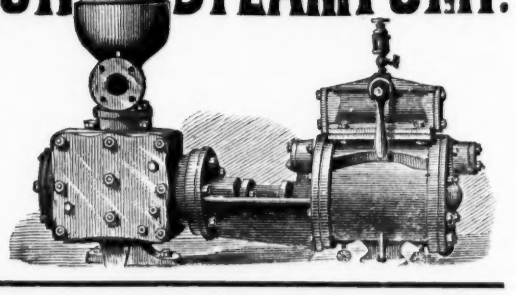

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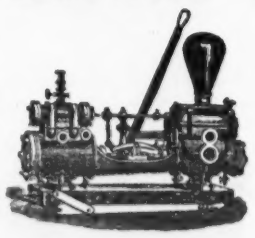

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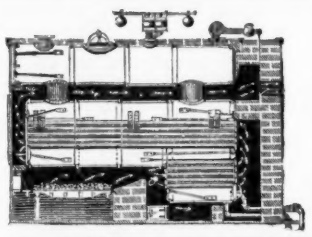
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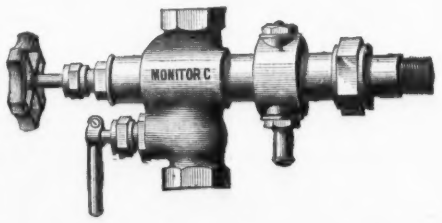

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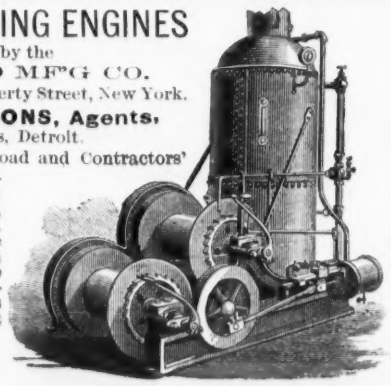
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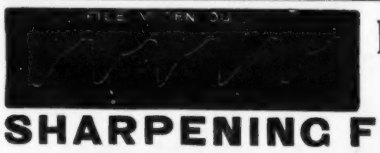
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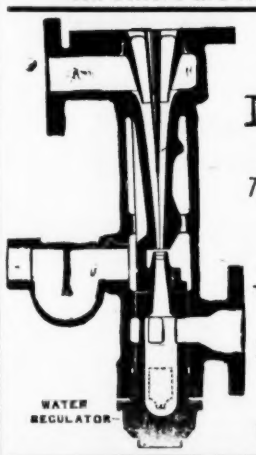

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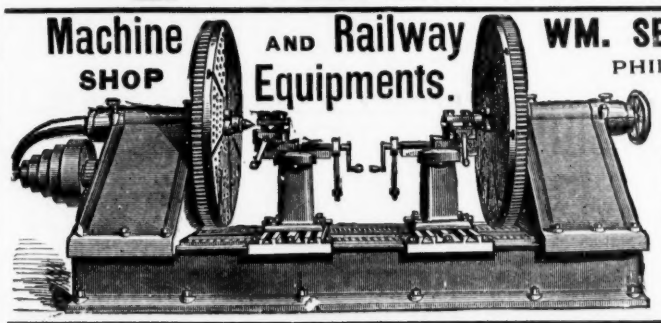
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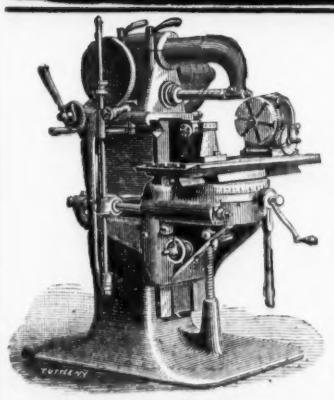
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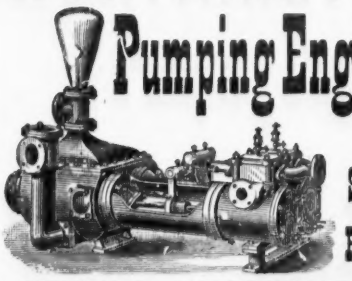
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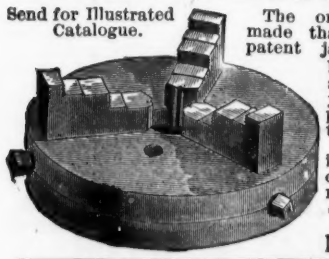

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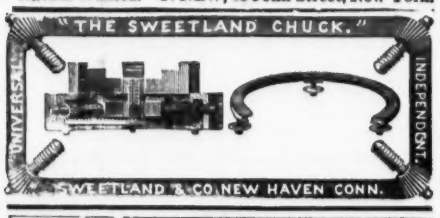

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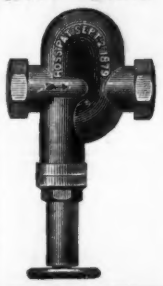

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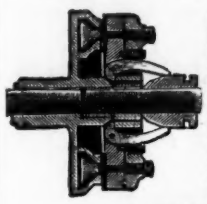

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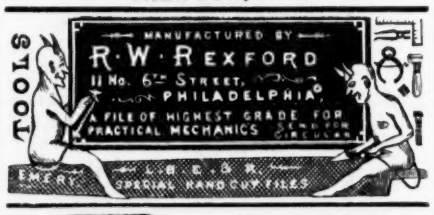

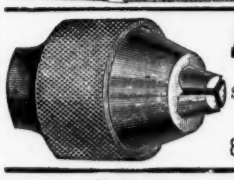

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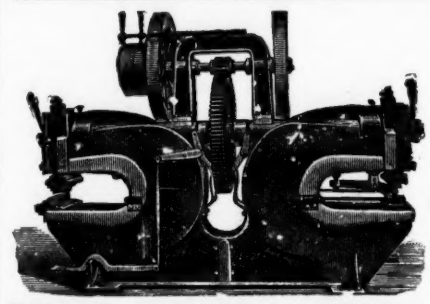

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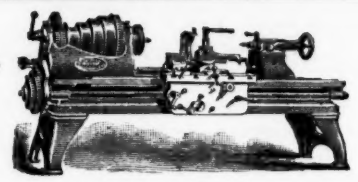

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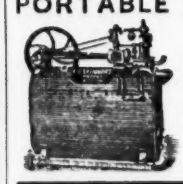

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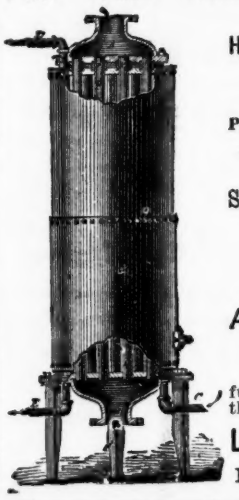

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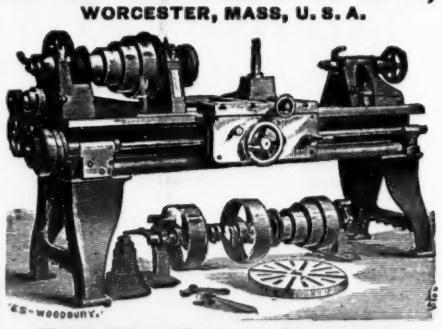

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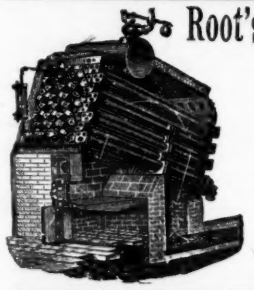

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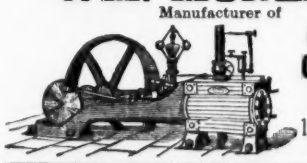

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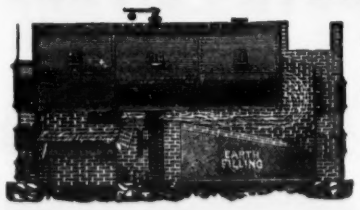

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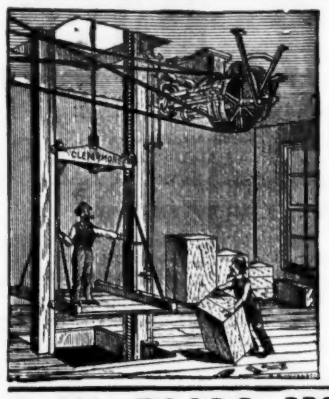

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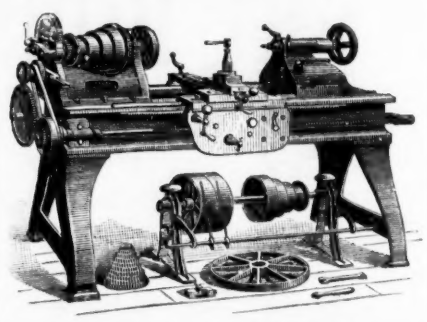

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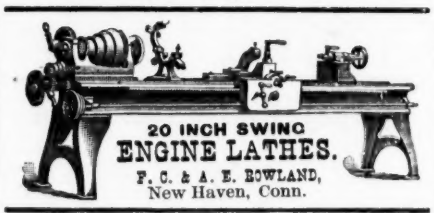

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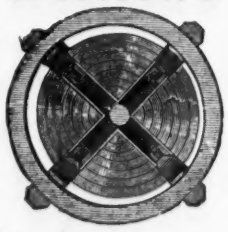

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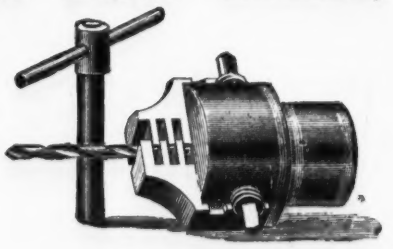

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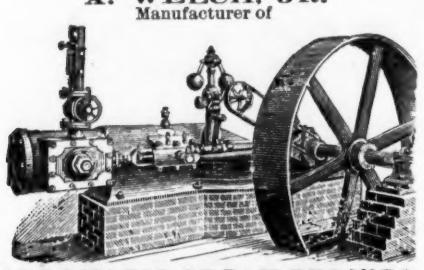

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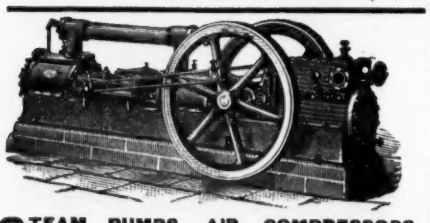

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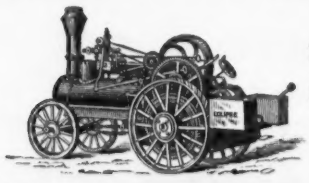

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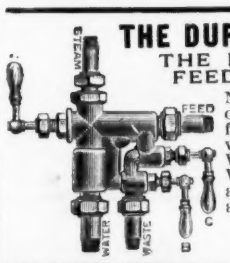

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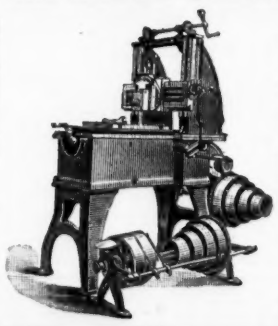

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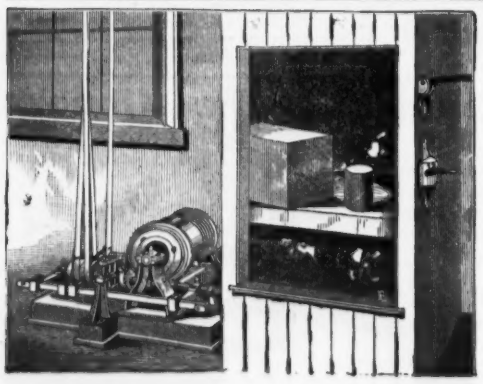

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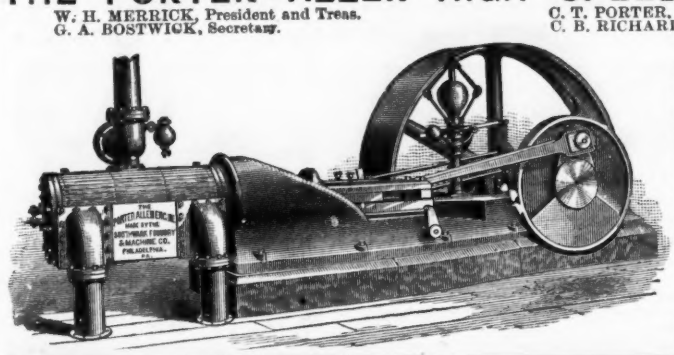

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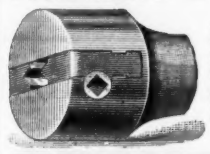

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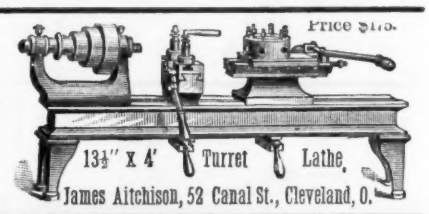

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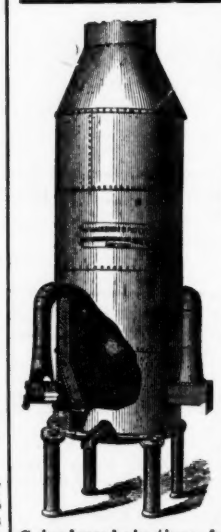

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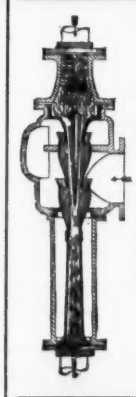

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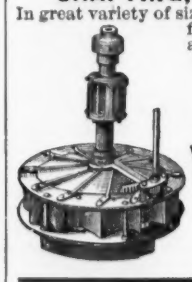

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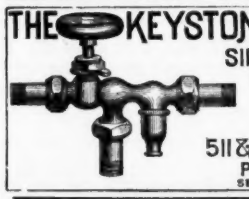

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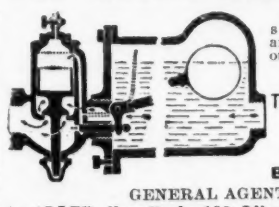
SAFETY! ECONOMY! CONVENIENCE!
Expense Ceases when Engine is Stopped.
When power is required at intervals it is the cheapest Motor known.

THE CURTIS STEAM TRAP.



Send for Circular stating advantages and superiority over other traps.
Manufactured by
THE CURTIS REGULATOR CO.
51 Beverly St.
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E. G. FELTHOUSEN, BUFFALO, N. Y.
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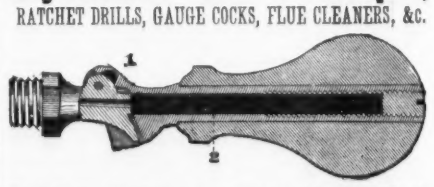
Cylinder Oil Pumps,
RATCHET DRILLS, GAUGE COCKS, FLUE CLEANERS, &c.



Each Gauge Cock has four inches of Jenkins' Packing. One packing will last several years.
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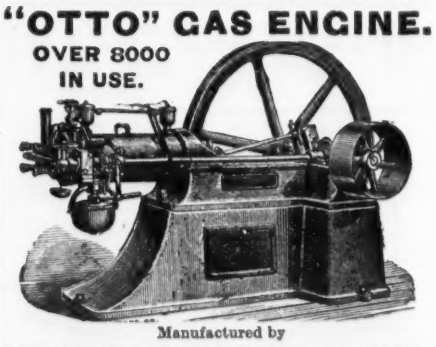
OVER 8000 IN USE.



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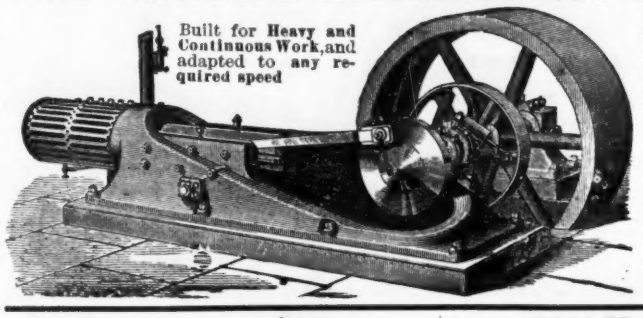
THE HARTFORD AUTOMATIC CUT-OFF ENGINE.



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Close regulation and best attainable **Economy of Fuel**. Circular and Practical Treatise on Steam Engineering sent on application.

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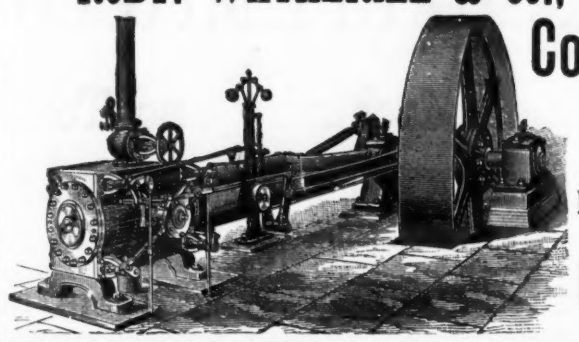

Corliss Engine Builders,
Condensing, Non-condensing, and Compound.
HIGHEST EFFICIENCY AND GREATEST ECONOMY.
Boiler Makers.
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HEWES & PHILLIPS' IRON WORKS,

NEWARK, N. J., Manufacturers of
Planers, Gear Cutters, Shapers, Slotters,
HYDRAULIC OIL PRESSES, and VENEER CUTTING MACHINERY, SHAFTING, and GEARING.
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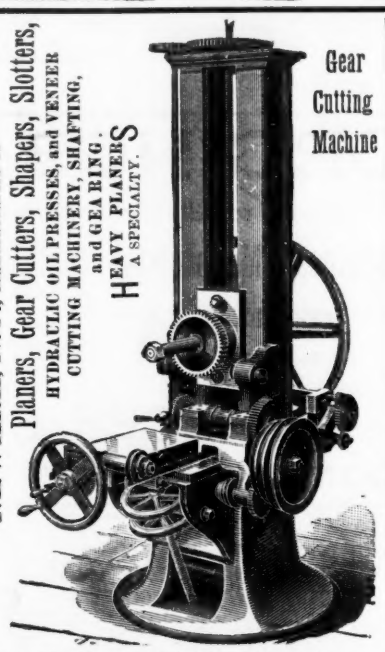

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The Allen Patent High Speed Engine,

Both Condensing and Non-Condensing. High economic duty and fine regulation guaranteed. Tubular Boilers and Steam Fittings.

FOR SALE.

4 New Cylinder Boilers 36″ diam. x 30′ long each, with fittings and fixtures complete, including 1 Steam Drum 24″ diam. x 13′ long; 1 Mud Drum 20″ diam. x 16′ 6″ long.

ALSO,

3 New Stationary 2 Flue Boilers, 42″ diam. x 30′ long, Flues 14″ diam., with complete fixtures and fittings, including 1 Steam Drum 24′ diam. x 12′ long. Breeching, Stack, Etc.

Full Specifications, with drawings, will be furnished upon application.

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ARMSTRONG'S IMPROVED ADJUSTABLE STOCK AND DIES FOR PIPE AND BOLTS.

Tapped to Standard Gauges. *Adjustable* to all variations in the size of fittings. Can be *resharpened without drawing the temper* by simply grinding them. Possessing practical advantages appreciated by all mechanics. Circulars sent free on application.

Manufactured by F. ARMSTRONG, Bridgeport, Conn.

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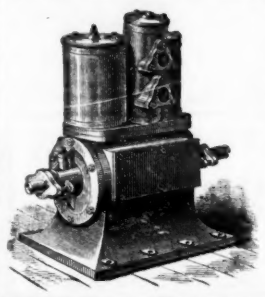
The Westinghouse Engine,

2 to 150 HORSE POWER.



Is absolutely balanced at all speeds, and may be run **from 300 to 1200 revolutions per minute.** Requires neither **Lining, Adjustment, Keying up, Packing, Lubrication or Wiping. SKILLED ENGINEERS ARE ENTIRELY DISPENSED WITH.** Is especially adapted to direct connection to high-speed machinery also, for all general purposes of belted power. Workmanship equal to the best machine tools. **All parts built strictly to gauge and interchangeable.**

DAMASCUS BRONZE.

A composition metal, unequaled in strength, durability, anti-friction qualities and price. Send for illustrated circular and price list.

THE WESTINGHOUSE MACHINE COMPANY,
Works at Pittsburg, Pa. **92 & 94 Liberty St., New York.**

Fox Turret and Speed Lathes

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Swivel Head Engine Lathes,

(18 and 26 in. from new patterns)

GEORGE GAGE, WATERFORD, N. Y.

CRAIG'S HYDRAULIC GOVERNOR,

FOR STEAM ENGINES,
The Most Perfect Governor Known.
RUNS IN OIL.
Guaranteed to accurately regulate all classes of engines.
Illustrated and descriptive Catalogue sent on application. Correspondence solicited.

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Sole Manufacturers,
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New & Second-Hand Machinery.

NOV. 22, 1882.

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1 " " 26 in. x 12 ft. Grant & Bogert. [New.
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1 " " 42 in. x 14 ft. New.
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1 " " 13 in. x 5 ft & 6 ft. Ames. "
1 " " 16 in. x6, 7 & 8 ft. Ames. "
1 " " 18 in. x8 & 10 ft. Lodge & Barker "
1 " " 27 in. x 10 in. Lodge & Barker.
1 " " 24 in. x 12 ft. Perkins "
1 " " 20 in. x 10 ft. Fifield. New.
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1 Plain Engine Lathe, 16 in. x 4 ft. "
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1 Fox Turret Lathe, 16 in. x 6 ft. Lodge & Barker. New.
1 Planer, 38 in. x 38 in. x 8 ft. New.
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1 " 20 in. x 20 in. x 4 ft. Good order.
1 " 16 in. Lever Table Drill. New.
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1 25 in. swing B.G. & S.F. Drill. Blaisdell. "
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1 15 in. Shaper. Gould & Eberhardt.
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Full assortment Milling Machines, Spindle Drills, &c., of Garvin's. New.
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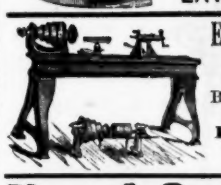

Extra Heavy 16 inch HAND LATHES.

Built by **FAY & SCOTT,** Machine Tool Builders.
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Send for description.

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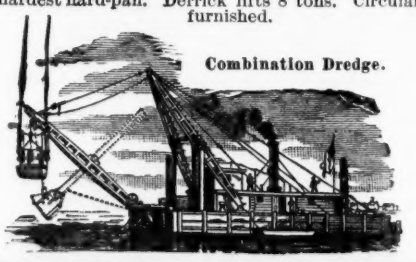
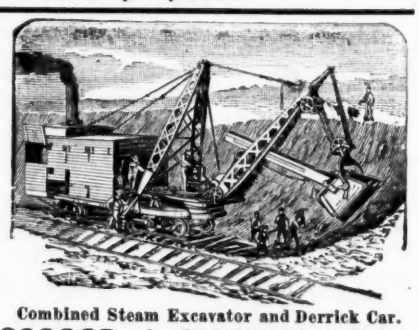
THE STEAM PUMPS
made by Valley Machine Co., Easthampton, Mass., are the best in the world for Boiler Feeding and other purposes.

DREDGES
guaranteed to excavate 50 per cent. more material from hard bottom than any other machine.

EXCAVATOR
has a capacity of 4 cubic yards per minute in gravel. Has proved very efficient and desirable in the hardest hard-pan. Derrick lifts 8 tons. Circulars furnished.



Combination Dredge.



Combined Steam Excavator and Derrick Car.

OSGOOD & MACNAUGHTON,
ALBANY, N. Y., Patentees,
Successrs to **RALPH R. OSGOOD, Troy, N. Y.**

CORLISS ENGINES FOR SALE.

PROMPT DELIVERY.

One 12 inch Cylinder. 16 inch Stroke. At once.
One 14 " 36 " In two weeks.

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MACHINERY.

90 inch Swing, 20 foot Bed, Engine Lathe. 2d hand.

23	"	16	"	"	"	
22	"	8	"	"	"	
21	"	6	"	"	"	
20	"	8	"	"	"	
20	"	6	"	"	"	
19	"	7	"	"	"	
18	"	7½	"	"	"	
18	"	6	"	"	"	
17	"	6	"	"	"	
16	"	6	"	"	"	
15	"	6	"	"	"	
14	"	6	"	"	"	

Large list of New Lathes. Various sizes and lengths.
20 inch x 50 inch x 16 foot Iron Planer. 2d hand.

36	"	36	"	9	"	"	"	"
56	"	56	"	16	"	"	"	New 2 hds.
38	"	38	"	12	"	"	"	" "

Large list other sizes, new.
Shapers, Drills, Bor'g Mills, Cutting-off Machines, &c.
Send for Circular of other tools.

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New & Second-Hand MACHINERY.

Nov. 22, 1882.

The following New and Improved Machinists Tools are part of what we have for early delivery

1 60 in. swing 24 ft. bed. Engine Lathe. Dec. 1,
1 42 in. " 20 ft. " " " " 1,
1 36 in. " 18 ft. " " " " 15.
1 36 in. " 14 ft. " " " " 15.

The following on hand:

1 New Corliss Engine. 12″ x 36″. Complete.
1 42 in. swing, 16 ft. bed, New Engine Lathe.
1 30 in. " 18 ft. " " " "
1 30 in. " 16 ft. " " " "
1 30 in. " 14 ft. " " " "
1 22 in. " 12 ft. " " " "
4 18 in. " 8 ft. " " " "
5 15 in. " 6 ft. " " " "
1 10 in. " 5 ft. " " " "
1 30 in. " 12½ ft. "
1 26 in. swing, 14 ft. bed.
1 12 in. swing, 6 ft. Hand Lathe. New.
1 10 in. " 4½ ft. Bed Hand Lathe. New.
1 33 in. x 10 ft. Planer. New.
1 38 in. x 12 ft. Planer. New.
1 32 in. x 8 ft. Iron Planer. New.
2 30 in. x 8 ft. Planers. New.
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2 22 in. x 4 ft. Planer. New.
2 38 in. Swing Upright Drills. B. G. & S. F. New.
1 23 in. Drill. B. G. & S. F. New.
1 22 in. " Upright Drill. B. G. S. F. New.
1 23 in. " Plain.
3 20 in. " "
1 18 in. Bench Drill.
1 4 spindle Drill. New.
1 3 " " "
2 4 " " Second-hand.
1 12 in. stroke Slotting Machine. New.
2 12 in. Shapers. New.
2 15 in. " "
2 12 in stroke Shapers, traveling head, 40 in. traverse double tables. New.
3 Wood's Patent Bolt Cutting Machines to cut from ⅛ in to 2 in inclusive. New.
1 Wall Drill, heavy. Second-hand. 60 in
1 Sellers Milling Machine. 2d-hand.
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1 No. 1 Screw Machine. Brown & Sharpe. 2d-hand
1 Screw Head Slotter. Second-hand.
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2 4¼ in Hyde's Patent Centering Machines. New.
1 Emery Grinder, 2d-hand, for 10 in. Wheels.
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2 Double-Acting Presses, No. 3, nearly new.
1 No. 00 Fowler Press.
4 Single-Acting Presses, for power, "
90 Foot Presses, nearly new.
2 Small Power Punching Presses. Second-hand.
1 Foot Punch, with bench. New.
1 Lot Pistol Machinery. Second-hand.
Lot of Forges 1 Railway Saw Bench, 1 Foot-power Circular Saw.
Cold Rolled Shafting, Pulleys, Hangers, Couplings, &c., always in stock.

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IRON WORKING MACHINERY

ON HAND.
NEW AND SECOND-HAND.

SPECIALTIES,
Extra Heavy Bridgeport 16 in. Swing Engine Lathes.
SECOR SCREW MACHINES.

WRITE FOR WHAT YOU WANT.

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Machinists' Power Tools & Supplies.

LIST OF LARGE LATHES ON HAND.

One Fitchburg, Triple Geared, Screw Cutting Engine Lathe, 50 inch swing, 20 foot bed.

One Special Shafting Lathe, 26 inch swing, 25½ foot bed, to take 20 feet between centers.

MACHINE TOOLS

now on exhibition at New England Manufacturers' and Mechanics' Institute,

Will be sold at very low prices

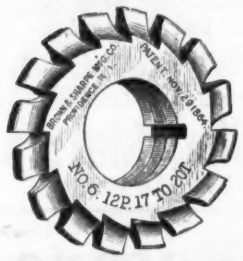
to save expense of removal.

Send for List and state what Tools you want.

BROWN & SHARPE MFG. CO.

PROVIDENCE, R. I.

Manufacturers of Machinery and Tools.



Gears Cut and Index Plates Made and Drilled to Order.

Patent Cutters for the Teeth of Gear Wheels,

can be sharpened by grinding without changing their form. Cutters made on this plan will outlast many of the old form, with the advantage of being always ready for use. If the cutter becomes dull before a wheel is completed, it can be taken out, sharpened and returned to its place in a few moments without risk of altering the form of teeth to be cut. Cutters for milling any irregular form made to order on the same plan. Parties having occasion to use mills for irregular shapes on sewing machine, gun or other work, will readily see the advantage such cutters possess over those in general use, both as regards economy and convenience. Descriptive circular with price list sent by mail on application.

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Railroad, Locomotive and Car Shop

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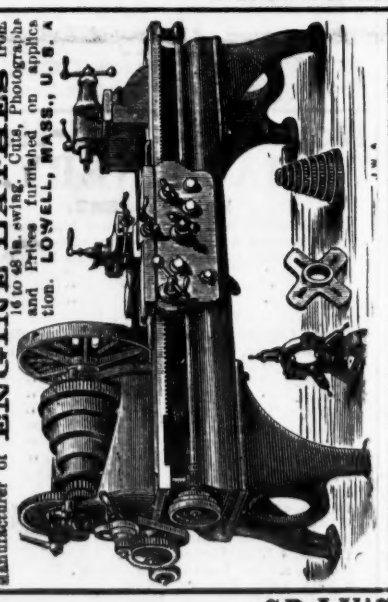
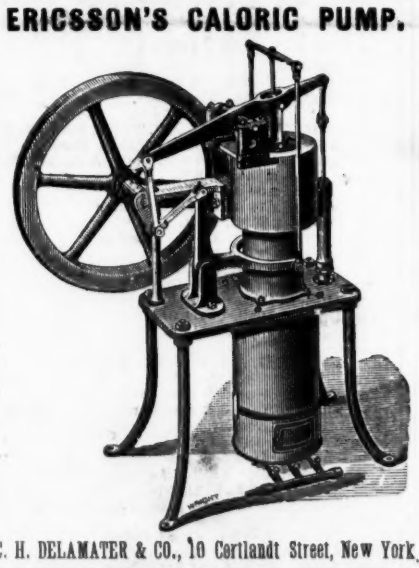


ERICSSON'S CALORIC PUMP.



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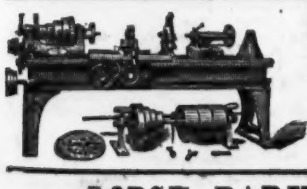

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Built to Standard Gauges and Templates, with Special Machinery.

EVERY MACHINE BELTED AND TESTED.

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LODGE, BARKER & CO., CINCINNATI, OHIO,

Manufacturers of ENGINE AND TURRET LATHES.

We have for immediate delivery several Back Geared Turret Lathes, with dove-tail set over. Also 18 inch Screw-Cutting Engine Lathes.

Quick delivery for 26 in. Swing Screw-Cutting Engine Lathes of new and improved designs. Very powerful and very convenient for handling.

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Emery Wheels and Grinding Machines.

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Have Ready for Delivery:

Drilling Machines—1, 42 in. table, automatic feed, back gears, quick return movement of spindle; No. 3 vertical, and No. 1, manufacturers; No. 0 gang drills, 3, 4 and 6 spindles; 1 14 in. Shaping Machine; 1 Horizontal Boring Mill, 14 ft. bed, 42 in. swing; 1, 10 in. Crank Shaper. Engine Lathes, 13 in. swing, 4, 5 and 6 ft. beds; 27 in. swing, 12 and 14 ft. beds; Hand Lathes, 12 and 15 in. swing, 5 and 6 ft. beds; Cutting-off Lathes for 2½ and 4 in. diameter. Revolving head Screw Machines, No. 1, No. 2, No. 3 and No. 4; Hand Milling Machines, No. 1; Bolt Cutters, turret head, No. 2, 3 and 4; National, No. 2, 3 and 4. No. 1, Screw Shaving Machines: No. 1 and No. 2 Screw Slotting Machines.

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Of Every Description, from 1-16 ounce to 30 lbs. weight, for

Guns, Pistols, Sewing Machines, Machinists' Tools,

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The Pioneers as a specialty in this line of business. Estimates given promptly on receipt of models Send for Catalogue and Descriptive Circular.

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MANUFACTURERS OF

14 in. & 26 in.

LATHES.

SPECIAL MACHINERY

Built to Order, and

TOOLS OF ALL KINDS,

Shop well furnished for good work.

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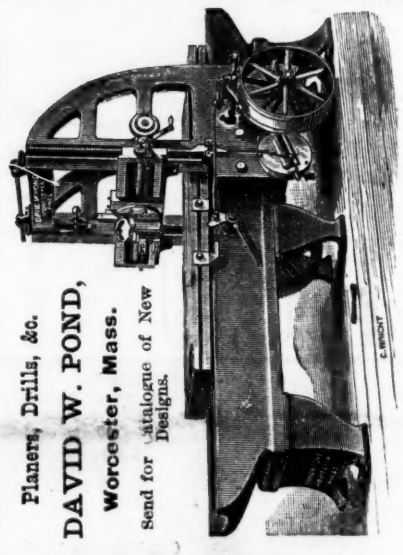
DAVID W. POND, Worcester, Mass.

Send for Catalogue of New Designs.



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Punching Presses DIES AND OTHER TOOLS For the manufacture of all kinds of SHEET METAL GOODS, DROP FORGINGS, &c. Stiles & Parker Press Co., Middletown, Conn.

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SECOND-HAND IN FIRST CLASS CONDITION FOR DELIVERY.

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1 Engine Lathe, 15 in. x 6 ft. Flather & Co.
1 " " 14 in. x 6 ft. Hand.
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1 Planer 22 in x 22 in. x 5 ft. N. Y. St. Engine Co.
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1 " 16 in. x 16 in. x 3 ft. P. & W. Co.
1 22 in. Upright Drill Press. F. E. Reed.
1 6 H. P. Engine. Baxter.
1 Bolt Cutter to 1 in. Wiley & Russell Co.

Also Milling Machines, Gang Drills, Hand Lathes, &c., of our own make.

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